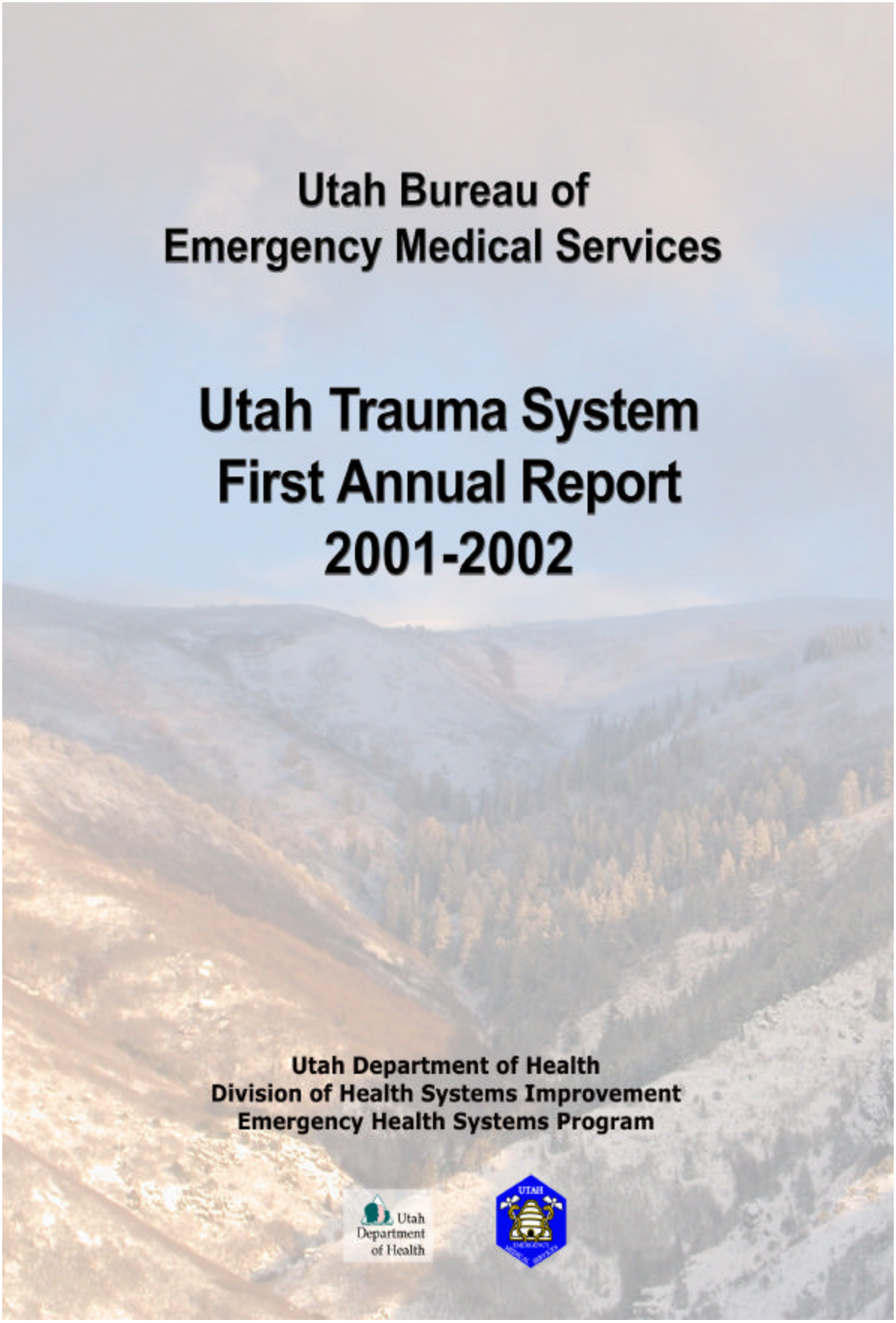
Utah Bureau of
Emergency Medical Services
Utah Trauma System
First Annual Report
2001-2002
Utah Department of Health
Division of Health Systems Improvement
Emergency Health Systems Program
Utah
Department
of Health
UTAH

Bureau of Emergency Medical Services

Emergency Health Systems Program

Trauma System Annual Report

2001-2002

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Dedication

This report is dedicated to those outstanding members of the Utah pre-hospital and trauma care communities, without whom the achievements described would not have been possible.

Special appreciation is extended to the following groups:
Hospitals participating in the Utah Trauma System
Trauma System Advisory Committee
Public Information, Education and Injury Prevention Subcommittee
Facility Standards Subcommittee
Trauma Review Team
Trauma Performance Improvement Team
Trauma Registry User Group
Emergency Medical Services Committee
Utah Hospital Association
Utah Medical Association
Utah Nurses Association
Utah Emergency Nurses Association
Utah Chapter of American College of Emergency Physicians
Utah Fire Chiefs Association
Utah Association of EMT's
and various EMS Councils
whose service to the emergency medical and trauma care system
of the state has been invaluable.

We would also like to express our appreciation to the Oregon Department of Human Services, Office of EMS & Systems, and the Maryland Institute for Emergency Medical Services Systems for allowing us to model our first state trauma system report utilizing their reporting format. The effort of mature trauma systems to share information and materials is essential to system development in other states and provides guidelines for standardization and reasonable comparisons.

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Executive Summary

This report summarizes the characteristics of the Utah Trauma System and the factors that describe trauma today. The data presented in this report originated from all acute care facilities reporting information to the Utah Trauma Registry. The hospitals began reporting data to the Utah Department of Health in 2001.

According to the Chapter 8a, Utah Emergency Medical Services System Act, Part 2A, Statewide Trauma System, Section 26-8a-253 states:

The department shall:

? Establish and fund a statewide trauma registry to collect and analyze information on the incidence, severity, causes and outcomes of trauma;
? Establish, by rule, the data elements medical care providers must report, and the timeframe and format for reporting.

Use the data collected to:

? Improve the availability and delivery of pre-hospital and hospital trauma care;
? Assess trauma care delivery, patient care outcomes and compliance with the requirements of this chapter and applicable department rules; and
? Regularly produce and disseminate reports to data providers, state government and the public.

This annual report (2001-2002) establishes the baseline for blunt and penetrating injury, the emergency response, the hospital management and the outcome of the most critically injured trauma patients. Data is used to describe the patient population treated throughout the trauma care system. As more data is collected over the years, we will be able to determine if changes in practice methods and outcomes have occurred.

The data that is included in the trauma registry must meet the inclusion criteria established in the rules R426-5, Hospital Trauma Categorization Standards. The inclusion criteria for a critically injured trauma patient is as follows:

? ICD-9 Diagnostic codes between 800 and 959.9 (trauma);
? 760.5 (fetus affected by trauma);
? 641.8 (antepartum history due to trauma);
? 518.5 (pulmonary embolism due to trauma);
? excludes specific ground level falls for the elderly **and**
? meets any of the following patient conditions:

- *Admitted to the hospital for 48 hours or longer*,
- *Transferred in or out of the hospital*,
- *Died,*
- *Transported by air ambulance.*

The following data summarize this report:

1. There are 41 acute care hospitals participating in the Utah Trauma Registry. Five of those facilities are voluntarily designated as a Level I or Level II trauma center.

2. The number of **critically** injured patients that met the trauma registry inclusion criteria that were treated through the Utah Trauma System during 2001 was **6,371**. Eighty-nine percent of patients admitted for trauma care suffered from critical injuries that resulted from blunt trauma. Falls accounted for 42.3% of unintentional injuries and motor vehicle crashes accounted for 23.1%

3. Only 54% of the patients reported to the Utah Trauma Registry were using a restraint device such as a car seat or seat belt. The incidence of death and severity of injury were lower for those using a restraint device.

4. The incidence of death is higher for those motorcyclists and bicyclists who were not wearing helmets.

5. In 2001, 297 people died due to their critical injury while receiving trauma care. This number does not include deaths occurring at the scene, during transport, or deaths occurring after discharge from hospital care.

6. Teens and the elderly experience a higher rate of death than other age groups. Trauma occurred more frequently among 15-29 year olds and among the elderly.

7. Approximately 2,935 (46.1%) of patients meeting the trauma registry inclusion criteria received care at a Level I trauma center and 744 (11.7%) were treated at a Level II trauma center. A large number of critically injured patients (42%) received care at other hospitals. *After initial stabilization*, twenty percent of patients were transferred to a designated trauma center for definitive management or subspecialty care.

8. Ninety-seven percent of the patients required hospitalization, 13.5% were admitted to an ICU and 15.2 % were taken to an operating room.

9. Approximately twenty percent of patients discharged from a trauma center required further rehabilitation or additional skilled nursing care.

Introduction

According to injury related national research, a systematic approach to trauma care can provide the best means to protect the public from death and disability. A trauma care system reduces death and disability by identifying the causes of injury and promoting activities to prevent injury from occurring, and assuring that the required emergency medical resources are readily available and able to deliver the "right" patient to the "right" facility at the "right" time.

Concentrating critical injury trauma care in facilities where specialized services are immediately available is essential to providing optimal care to the trauma patient. An organized and consistent approach to trauma care allows for the rapid assessment (triage), transport and treatment of an injured victim.

The purpose of this report is to describe the current activities, achievements and efforts of the Utah Bureau of EMS in establishing a statewide trauma system. According to the Chapter 8a, Utah EMS System Act, the department is to establish and actively supervise a statewide trauma system to:

??Promote optimal care for trauma patients;

? Alleviate unnecessary death and disability from trauma and emergency illness;

? Inform health care providers about trauma system capabilities;

? Encourage the efficient and effective continuum of patient care, including prevention, pre-hospital care, hospital care and rehabilitative care; and

? Minimize the overall cost of trauma care.

In this report, we will describe the status of the trauma system in Utah, provide a trauma patient profile, hospital resource utilization profile, and the activities and accomplishments of the Bureau of EMS to support trauma system development. By linking trauma registry data to the EMS incident report data, we hope to provide more informative reports for EMS resource utilization in the future. Eventually, we intend to link with other sources of data (vital statistics, hospital discharge, rehabilitation data) to provide a more comprehensive perspective of trauma in Utah. We will also be able to provide trending analysis of trauma data with additional years of trauma data collection.

The data used in the development of these profiles, originates from the acute care hospitals which have been required to submit trauma registry data to the Utah Department of Health beginning January 1, 2001. The data elements, timeframes and reporting formats have been established in administrative rule R426-5 Hospital Trauma Categorization Standards.

The trauma registry uses a three-pronged strategy for its data collection system. The first strategy consists of the designated trauma centers and one additional facility. They utilize the Clinical Data Management Software, TraumaBase to collect and download data to the Intermountain Injury Control Research Center (IICRC). This research center acts as the repository for the state data and provides the analysis and generation of requested reports for statewide quality improvement. The TraumaBase software allows the larger facilities to analyze their own data, generate reports and conduct quality improvement.

Medium sized facilities (those facilities who provide care for 200 or more trauma cases that meet the inclusion criteria) utilize a modified version of the software, purchased by the Bureau for each

facility. The Bureau also provides grant funds to these facilities for personnel expenses related to data abstraction and data entry. A trauma registry consultant contracted by the department provides technical assistance and training for the use of the software.

The third strategy consists of smaller facilities that copy applicable patient records which are mailed to the IICRC for entry into the trauma registry. The department provides reimbursement to small facilities for their mailing and copying expenses and provides grants to the medium sized facilities for the cost of data entry personnel.

The hospitals report the data to the IICRC for each quarter within 90 days of death or discharge of the patient. The registry collects data regarding the causes, emergency response, referring facility care, emergency department treatment, patient demographics, admission information, outcomes and payment sources.

Hospitals have the capability to access their data on a secure internet web-site. They can develop ad hoc reports that compare their own data with similar sized facilities. The aggregate data presented in this report can also be utilized by the facilities to compare their data with hospital specific data that will be provided to each facility on a compact disc in conjunction with this state report.

Other information presented in this report was provided by EMS Bureau staff, trauma center staff and the IICRC staff.

For additional information regarding Utah's Trauma System, call the Bureau of Emergency Medical Services at (801) 538-9995.

Bureau of Emergency Medical Services

From the Bureau Director
Jan Buttrey

"Trauma kills. Trauma maims. Trauma is a disease it is not an accident. Like heart disease and cancer, trauma has identifiable causes with established methods of treatment and defined methods of prevention. Much can and should be done to reduce the incidence of trauma and to improve trauma treatment in this country." (*Oct 2002*, *Trauma System Agenda for the Future; American Trauma Society and the U.S. Department of Transportation*)

In 1995, in the United States, nearly 148,000 lives were cut short due to trauma. Most of those lost were young. Trauma results in an average of 36 years of productive life lost as compared to 12 years from cardiac disease and 16 years from cancer. Ten times that number of Americans survive traumatic events, only to face life-long disability that takes its toll on the individual, his family and community.

The total cost of injury in the United States in 1995 was estimated at $260 billion and injury and its consequences accounted for 12 percent of all medical spending. Nationally, for every 1 trauma death, there are 10 inpatient hospitalizations, 405 emergency department visits and an estimated 600 serious injuries are treated elsewhere.

In Utah, over the three-year period of 1996 - 1998, the average annual count due to trauma for each category is as follows:

- ?1,134 deaths
- ?12,130 Hospital discharges, and
- ?179,002 Emergency Department visits.

In 2001 alone, there were 1,163 deaths due to trauma in Utah.

When presented with this information, the 2000 Utah Legislature determined that a statewide trauma system must be created and enacted. Webster's New World Dictionary describes a system as: *"An established way of doing something; method; procedure. Orderliness or methodological planning in one's way of proceeding."*

When discussing a statewide Trauma System, people tend to think only of the designation of trauma centers. In reality, this is only a small part of the total concept of a trauma system. Designation is a tool to assist medical professionals in matching the best services to treat a specific patient. More importantly is the internal organization within the facility to provide timely services when needed.

In total, a trauma system entails an organized approach to caring for patients. This approach needs to be addressed in the pre-hospital arena; within any hospital that initially receives a trauma patient; by developing an organized, coordinated manner of transferring patients to the best facility to meet the needs of the patient; and a systematic way of treating the patient through intensive care and inpatient hospitalization; and rehabilitation.

Many studies conducted throughout the nation have shown that a large percentage of preventable deaths are as a result of care givers overlooking basic care principles to focus on the more severe or dramatic injuries.

In the *Journal of Trauma, Injury, Infection and Critical Care (November 1995)*, it was reported, "Inappropriate care rendered in the emergency department related to airway and chest injury management occurs at a

high rate. This seems to be a major contributor to preventable trauma deaths..." It has been determined that if a system of care is utilized in all instances, both pre-hospital and hospital, significant errors of this type can be avoided. Any traumatized patient deserves to be treated in a systematic manner that will insure the best possible treatment and recognition of all injuries.

It is the goal of the Utah Department of Health to provide the tools to help all facets of the trauma system to voluntarily work towards improving their care to all trauma patients regardless of severity.

This report is one of those tools. It will establish a baseline of data to examine the most seriously injured patients throughout the state. It represents the first full year of data reporting. A data base is only as good as the accuracy and completeness of its data and we have discovered a number of areas that can be improved in order to provide a more complete and accurate picture of the status of critical trauma care in Utah. We will continue to work to improve this tool with each year's report.

Utah Trauma System

Trauma system development is defined in terms of administrative, clinical and operational components. The administrative components include legislation, leadership, system development, and finances. The operational components are grouped into five major categories: public information, education, and prevention, human resources, pre-hospital care (triage and transport), definitive care and evaluation. A brief description and status for each of the components is provided below.

Legislation and System Development

In 1981, the Utah Legislature established the EMS System Act. This statute was the enabling legislation that allowed the Department of Health to categorize facilities and designate trauma centers. Four trauma centers were designated in 1985. With no funding or infrastructure to further develop the trauma system, the facilities were self-designated until 1992. The facilities were re-designated at that time, utilizing the 1986 American College of Surgeons criteria.

The early 1990's brought about a new wave of federal guidance and funding. Utah was fortunate to receive grant funds and hire a consultant to facilitate the development of the 1995 Utah Trauma System Plan. In 1997, the trauma rules were revised to update antiquated terminology and to revise the designation criteria from the 1986 ACS criteria to the modified ACS criteria established in the trauma plan. By 2002, five facilities have been designated as trauma centers using the 1995 criteria and the new verification process which includes an ACS verification site visit for Level I and II Trauma Centers.

In the 2000 Utah Legislative session, the EMS System Act was updated and modified to include the development of a statewide inclusive trauma system. In summary, the statute and rules require the department to:

- Establish a statewide trauma system
- Establish a trauma system advisory committee
- Develop a state system plan
- Support the system by providing oversight, ongoing evaluation, educational programs, encouraging cooperation between community organizations and healthcare providers
- Implement a quality assurance program
- Establish trauma center designation requirements
- Develop standards that categorize trauma centers, that triage trauma victims at the initial point of contact and that ensure trauma patients are sent to the appropriate health care facility
- Establish and fund a statewide trauma registry
- Designate by rule, trauma centers requesting voluntary designation
- Establish by rule, model state guidelines for triage, treatment, transport and transfer of trauma patients
- Regularly produce and disseminate reports.

The legislation also required hospitals to submit trauma registry data until July 1, 2003. However, in the 2003 Legislative session, the requirement to submit data was extended to December 31, 2006. Funding will continue to be provided to the hospitals for their data collection efforts.

In 2002, HRSA funding once again became available for trauma system development. The Bureau successfully acquired grant funding to support the establishment of trauma system task force to update the 1995 state trauma system plan which was based on national guidelines and standards. This document has been developed and is currently under internal Department of Health review prior to statewide distribution.

Leadership

In order to fulfill the responsibilities established in the trauma system legislation, several groups have been established. These include the Emergency Health System Program within the Bureau of EMS, the Trauma System Advisory Committee, Facility Standards Subcommittee, Public Information, Education and Injury Prevention Subcommittee, Trauma Review Team, Quality Improvement Team, and the Trauma Registry User Group.

The Bureau of Emergency Medical Services is responsible for the development and enforcement of administrative rules governing ambulance licensure, EMS personnel certification, data collection, EMS grants program and trauma system development. Trauma system integration and coordination is provided by the trauma program staff: Jolene Whitney, MPA, Program Manager; Karen Mickelson, RN, BSN, Trauma System Coordinator and Jennifer Pratt, BS, Administrative Assistant.

The Trauma System Advisory Committee is a statutory multi-disciplinary group established to assist the department in evaluating the quality and outcomes of the overall trauma system, review and comment on rules and proposals and provide expert advice and recommendations regarding trauma system needs and the development of trauma guidelines. Richard Barton, MD, University of Utah Hospital trauma surgeon, is the current Chair of the committee. Two subcommittees of the TSAC are:

Facility Standards, Steven Morris, MD, Chair

Public Information, Education and Injury Prevention, Trudy Reynolds, RN, Chair.

In addition to the statutory committee, the EMS Bureau has established three additional multi-disciplinary teams to assist with trauma center designation, quality improvement and trauma registry implementation. These teams are:

Trauma Review Team, Dan Vargo, MD, Chair

Performance Improvement Team, Stephen Hartsell, MD, Chair

Trauma Registry User Group

The Department, Executive Director or his designee appoints the members of these advisory committees and teams.

Funding

The EMS grants program provides funding for the trauma system. The Department receives dedicated credits from a surcharge imposed on all criminal fines and forfeitures specifically to improve the state EMS and trauma system.

The Grants Program funds allocated during FY 2003 is as follows:

$250,000

The following provide additional funding for the trauma system:

HRSA - $40,000 for trauma task force meetings to update the state trauma plan

CAH/Flex - $15,000 for TEAM and PHTLS courses

Utah Highway Safety Office - $14,000 for PHTLS and TEAM courses, Trauma Conference sponsorship, and national networking and training for program staff.

Public Information Education and Prevention

Injury prevention can bring about a change in knowledge, attitude, and behavior on the part of society, which would benefit from the change. However, factors associated with injury are so varied that their prevention needs the attention of many disciplines and agencies. The Bureau of EMS concentrates its efforts on public education and awareness. In the past year, the Trauma System Coordinator collaborated with several agencies to provide educational opportunities for the community, EMS providers and hospital personnel. The Public Information, Education and Injury Prevention

Committee (PEP) has been looking at many injury prevention programs that will benefit the public and designing new programs when the need exists.

The Trauma System Coordinator along with EMSC and the Bureau of Health Promotion and Injury Prevention staff, developed a survey to identify injury prevention training and to assess deficiencies and resources available to both hospitals and pre-hospital providers. The Trauma System Coordinator is a member of the Traumatic Brain Injury Advisory Board and participates in this capacity to coordinate a statewide traumatic brain injury action plan. She also contributes to the Injury Coordinating Committee that serves as the internal advisory committee for revising the statewide Injury Prevention Plan.

EMSC

The Emergency Medical Services for Children program (EMSC) is an active participant in trauma education and injury prevention. Through a public-private partnership with Primary Children's Medical Center and the Bureau of EMS, Dale Maughan, RN, program manager and Peter Morris, RN, coordinate the statewide EMSC activities in Utah. The activities of the EMSC program for this year included the following:

Pediatric Education for Prehospital Professionals Courses:

- 22 in state
- 3 out- of-state

This is a 16-hour course for pre-hospital providers that includes injury prevention and trauma components, didactic and hands-on skill stations.

The EMSC program co-sponsored an Injury Prevention Conference with the Utah Emergency Nurses Association in April and an Issues in Pediatric Care Conference in October. The EMSC program was also involved with another conference with trauma-related topics, the Critical Issues Facing Children and Adolescents Conference, which was conducted in November. One of the topics included START Triage Training. The EMSC program also provided training to Utah EMS instructors at the Bureau Semi-annual Instructor Seminars.

The EMSC program is actively involved in injury prevention activities. They conducted 25 Bicycle Rodeos throughout the state, provided over 500 helmets to parents and kids and actively participate on the following committees: Child Fatality Review Committee, Safe Kids, Coalition for Utah Traffic Safety, DOH Injury Control Committee, PCMC Trauma Morbidity and Mortality Committee.

The EMSC program applied for and successfully obtained federal grant funding for Enhancing Pediatric Patient Safety. There are 13 rural hospitals enrolled in the project that includes the evaluation of the effectiveness of the Broselow Color-Coded System in reducing errors that might occur when caring for pediatric patients.

Human Resources

Human resources for the Utah trauma system includes the pre-hospital workforce, education and training of health care providers, standards for personnel and trauma education. Much of Utah is rural which provides an even greater challenge in assuring that appropriate education for physicians, nurses, and EMS personnel is affordable and available.

Leslie Johnson, is the program manager for the Certification and Grants Program. The program is responsible for the certification of EMS personnel which includes the following:

Dispatchers' - 540
Basic EMTs - 6,230
Intermediate EMTs - 1,652
Intermediate Advanced EMTs - 4
Basic EMTs with IV certification - 398
Paramedics' - 911

There are currently 9,735 EMS personnel certified in the state of Utah.

The Bureau of EMS provides oversight for the training of EMS providers throughout the state. Don Wood is the program manager for the Standards and Evaluation Program. This program includes the establishment of training and testing standards for all of the above-mentioned levels of EMS personnel. The following is the number of courses that were approved and conducted during the held in calendar year 2002:

EMT-Basic - 117
EMT Intermediate - 21
EMT-IV - 5
EMT-Intermediate Advanced - 12
Paramedic - 5
Course Coordinator - 2
New EMS Instructor - 2
Emergency Vehicle Operations - 0
New Training Officer - 2
Dispatcher - 6
Medical Director - 0.

The Bureau also oversees the following seminars utilized in recertification requirements:

Current Course Coordinator – 2
Semi-annual Instructor - 2
Current Training Officer - 2

The number of personnel certified in various EMS courses during 2002 includes:

EMT-Basic - 1,278
EMT-Intermediate - 284
Paramedic - 105
EMS Instructor - 583
Course Coordinator -96
EMT-IV - 55.

With assistance from our trauma system constituents, Karen Mickelson RN, BSN, the Trauma System Coordinator developed and implemented a trauma education program called TEAM (Together Everyone Achieves More). This program was modified from a course developed by the Montana EMS Bureau. To date, we have conducted the course in Price, Nephi, Delta and Fillmore,

Thanks to additional federal funds, the Trauma System Coordinator has been appointed as the Pre-hospital Trauma Life Support Coordinator (PHTLS) for Utah. This appointment is provided by the National Association of Emergency Medical Technicians, in conjunction with the American College of Surgeons, which develops and sponsors the PHTLS courses. We have conducted two instructor courses and two advanced provider PHTLS courses in St. George and Salt Lake City.

The trauma program staff have also developed numerous power-point presentations to be used by the Trauma System Speaker's Bureau. This group consists of physicians, nurses and specialists who have volunteered to travel throughout Utah to educate various groups about the benefits and characteristics of a trauma system. These presentations are guided by national research, registry data, ACS guidelines, and administrative rules and statute.

Pre-hospital Care

Pre-hospital care includes communications systems, medical direction, patient care protocols, guidelines and transport. Paul Patrick is the program manager for the Technical Assistance and Quality Assurance Program that includes the licensure and quality assurance reviews for EMS providers (ambulance, quick response units, paramedic rescue and air ambulance). Currently, there are 99 licensed agencies holding 121 different levels of licensure, (some agencies hold more than one type of license) as indicated below:

Air Ambulances -11
Paramedic Ambulances- 31
Intermediate Ambulances - 66
Basic Ambulances- 13

Only licensed agencies can transport patients, and each licensed agency is assigned an exclusive geographic service area. The Bureau is currently processing four new applications for paramedic licenses and two intermediate up-grade applications. The program also designates 50 quick response unit (QRU) agencies that include:

Intermediate QRU's - 10
Basic QRU's - 40

A designated agency provides first response for stabilization until a licensed provider arrives to continue care and provide patient transport. Each of the designated and licensed agencies has a certified off-line medical director that work closely with the hospitals within their service area.

There are 42 designated dispatch agencies in the state who are all public safety answering points (PSAPs) that receive 911 calls and dispatch EMS agencies. In eight counties (Salt Lake, Utah, Wasatch, Summit, Tooele, Davis, Weber, and Morgan) the EMS agencies, police departments, fire departments, and hospitals use the 800 MHz communications system.

The system allows communications using coordinated repeaters to link users within all of the eight counties regardless of location. The 800 MHz system has bridged the gap of the old line-of-sight system, which limited the ability of users to talk to each other. This is especially helpful in the provision of trauma care because a licensed or designated agency that responds within the eight county areas can have instant access to a trauma center.

Triage and Transport

Each year a management seminar is conducted to train and up-date all the managers of the 99 agencies. The seminar covers topics ranging from how to deal with difficult people, to changes in state and federal laws. A major portion of the management seminar focused on trauma education and recognition. The 2002 seminar was held in Park City and attended by 86 participants.

At all Bureau seminars and workshops, medical directors in conjunction with the agencies and hospitals are encouraged to develop local protocols concerning the trauma triage, treatment, and transport of trauma patients. State guidelines and rules for triage, transport and transfer are currently under development.

A Trauma Assessment poster was developed and distributed to all hospitals and EMS agencies. It is an assessment tool for health care providers to determine the severity of injury for each trauma patient. The poster contains the Revised Trauma Score, burn scoring, Glascow Coma Score, and also provides pediatric assessment information. A curriculum for utilization of the assessment tool can be found on the Bureau website.

Definitive Care

Definitive care involves trauma care, designation and categorization, inter-facility transfer and medical rehabilitation. What distinguishes a designated trauma center from other facilities is that it has voluntarily chosen to meet criteria, which guarantees the immediate availability of surgeons, anesthesiologists, specialists, nurses, and ancillary services on a 24-hour, 7 days a week basis.

Hospitals may be designated as Level I, II, III, IV or V. Currently, there are five facilities that have been voluntarily designated as a Level I or II trauma center. The Utah trauma criterion for designation can be found in the 1995 Utah Trauma System Plan. A multi-disciplinary task force developed these criteria based on the American College of Surgeons guidelines.

Under the 1995 Utah Trauma Plan, trauma centers may define and determine the level of trauma care they wish to provide. They also identify their current capabilities. Designation allows healthcare providers with a means of recognizing the various levels of service capabilities, within their own institution and other facilities, thus allowing them to make informed decisions as to the care and treatment of their injured patients. Designated trauma centers have staffed and equipped their facilities to meet the special needs of the critically injured trauma patient.

The Designated Trauma Centers within the Utah Trauma System are:

Level I Trauma Centers

University of Utah Hospitals and Clinics*
Salt Lake City

LDS Hospital*
Salt Lake City

Primary Children's Medical Center
(Regional Pediatric Trauma Center)
Salt Lake City

Level II Trauma Centers

McKay Dee Hospital
Ogden

Ogden Regional Medical Center*
Ogden

**American College of Surgeons Verified*

Designation and Verification

The following paragraphs describe facility standards allowing healthcare facilities to determine the level of trauma care they wish to provide and identify current capabilities. The criteria are voluntary. Designation as a trauma center affords healthcare providers a means of recognizing the various levels of service capabilities, within their own facility, thus allowing them to make informed decisions as to the care and treatment of their injured patients. In urban areas, designation may assist with determining patient destination. Designation is not intended to provide a means of determining hospital capabilities by the lay public.

LEVEL I

- Acts as a regional tertiary care facility in the trauma system.
- Provides definitive and comprehensive care for the injured adult and/or pediatric patient with complex, multi-system trauma.
- Provides leadership in professional and community education, trauma prevention, research, rehabilitation and system planning.
- Board certified surgeons, neurosurgeons and anesthesiologists are on-call and promptly available.
- A broad range of sub-specialists (cardiac surgery, hand surgery, microvascular (replantation), infectious disease) are on-call and promptly available to provide consultation or care to the patient.
- ICU physician coverage 24 hours/day, full time Trauma Coordinator, OR suites staffed in-house 24 hours/day, cardiopulmonary bypass.

(*Level I Regional Pediatric Trauma Centers have separate standards specific to the care of pediatric trauma patients.)*

LEVEL II

- Provides definitive care for complex and severely injured pediatric and adult trauma patients.
- Physicians are ATLS trained and experienced in caring for trauma patients. Nurses and ancillary staff are in-house and immediately available to initiate resuscitative measures and stabilization for the trauma patient.
- Board certified surgeons, neurosurgeons and anesthesiologists are on-call and promptly available.
- A broad range of sub-specialists (critical care, cardiology, orthopedic surgery) are on-call and promptly available to provide consultation or care to the patient.
- Serves as a regional resource center for definitive care, quality assurance, community education, outreach and injury prevention.

LEVEL III

- Provides initial resuscitation and immediate operative intervention to control hemorrhage and to assure maximal stabilization prior to referral to a higher level of care.
- Comprehensive medical and surgical inpatient services are available to those patients who can be maintained in a stable or improving condition without specialized care.

• Works collaboratively with other trauma centers to develop transfer protocols and a well defined transfer sequence.
• An in-house multi-disciplinary trauma resuscitation team is available to assess, resuscitate, stabilize and initiate transfer if necessary upon arrival of the patient to the emergency department.
• A board certified general surgeon trained in ATLS is on-call and available to the patient.
• Level III trauma centers work with Level I and II facilities to develop and implement outreach programs for Level IV and V facilities in their region.
•Provides community education, outreach and injury prevention programs.

LEVEL IV

• Generally licensed, small rural facility with a commitment to the resuscitation of the trauma patient.
•Provides initial resuscitation, evaluation, stabilization, diagnostic capabilities and written transfer protocols in place for major trauma patients to be transferred to a higher level of care.
•Staffed with a physician on call from outside the hospital and also requires a general surgeon to be on call outside of the hospital.
•May provide immediate operative surgical intervention to control hemorrhage to assure maximum stabilization prior to transfer.
•Trauma trained nursing personnel are immediately available to initiate life-saving maneuvers and critical care services as defined in the service's scope of trauma care.

LEVEL V

• Provides initial evaluation, stabilization and transfer to a higher level of care.
• Generally licensed, small rural facilities with a commitment to the resuscitation of the trauma patient.
• May or may not be staffed with a trauma-trained physician but rather a nurse practitioner or physician's assistant.
•Major trauma patients are stabilized and transferred.

Voluntarily Designated Trauma Centers

LDS Hospital

Level I Trauma Center

Located in Salt Lake City, LDS Hospital reported receiving 1032 trauma patients in 2001, according to the Utah Trauma registry. Mark H. Stevens, MD, FACS, serves as the Trauma Program Medical Director and Sue Day, RN, MS, serves as the Trauma Nurse Coordinator.

LDS Hospital successfully passed the American College of Surgeon's verification program in June of 2001. LDS Hospital serves as a tertiary care facility for Utah, Nevada, Idaho and Wyoming. Several members of the hospital staff have been actively engaged in efforts to improve trauma care in the state by participating with the Trauma System Task Force and various state trauma committees.

LDS Hospital is actively involved in providing trauma related education and outreach activities. Advanced Trauma Life Support courses for physicians are offered quarterly as well as quarterly offerings of the Trauma Nurse Core Course. They provide additional trauma courses in both basic and advanced ICU courses. Trauma related education is also offered to community and school groups and individual facilities. They serve as a resource center for training of student

nurses, mid level providers, EMS providers and house staff.

Varieties of programs are in place for fall prevention in the elderly, seat belt and child car seat use. LDS Hospital frequently collaborates with community groups such as Sandy Police Department, Highway Patrol and others to promote injury prevention activities.

LDS Hospital has a number of research projects and articles that are in progress or have been published dealing with topics such as:
1. Case Report: Delayed Splenic Rupture
2. Fall Prevention After Fall-Related Trauma in the Elderly
3. Iatrogenic Methemoglobineima from Benzocaine Spray in Trauma
4. Repair of Grade VI Hepatic Injury: Case Report and Literature Review
5. ADE's in Trauma Patient's.

Hospital administration has made a substantial commitment to their trauma program. In the past year the following program improvements have been made:
1. Dedicated office space for trauma service personnel which includes:
- Trauma Medical Director
- Trauma Clinical Program Director
- Trauma Coordinator
- 1.5 trauma registrars
- 5 full time Mid-Level Providers
- Trauma Secretary

2. Increased on-call pay for trauma service physicians and sub-specialists
3. Addition of a fifth in-house mid-level practitioner from 18:00- 06:00 every third night to cover the trauma service.
4. Upgrade CT to a light speed 8 slice detector system in June 2002
5. Upgrade of MRI equipment November 2002
6. Dedicated x-ray technician in the ED 24/7.
7. Our Transitional Care Unit was closed in September 2002, to add an additional 39 acute care beds.

University of Utah Hospitals and Clinics

Level I Trauma Center

The University of Utah Level I Trauma center reported receiving 1315 trauma patients in 2001, according to the Utah Trauma registry. Steven Morris, MD, FACS, serves as the Trauma Program Director and Janet Cortez, RN, MSN as the Trauma Program Manager.

As an American College of Surgeons verified Level I trauma center, UUHC is a center of excellence not only in the immediate Salt Lake City metropolitan area, but also to victims of trauma from several surrounding states. The Intermountain Burn Center, housed within UUHC, has long been the major referral center for the Intermountain area for the treatment of both adult and pediatric thermally injured patients. It is a 13-bed intensive care and rehabilitation unit that admits 300 patients per year with more than 1,200 clinic visits annually.

The newly opened (April 2003) George S. and Dolores Dore Eccles Critical Care Pavilion has provided a spacious four bed trauma suite, and an additional seven ED treatment rooms, and by the fall of 2003, a 10 bed observation unit. The Surgical Intensive Care Unit will increase by 20 beds, and six additional operating rooms will open in July of 2003.

The University of Utah Hospital is involved in providing Advanced Trauma Life Support courses; Advanced Burn Life Support courses and a variety of community based

prevention and outreach programs. A critical care nurse internship is currently underway, as well as trauma related education for care providers in a variety of specialties. The Emergency Department staff recently provided a "mock" car crash scene on the football field of a local high school, which graphically enforced the "Don't Drink and Drive" motto, making a vital impact on the entire student body.

Active research projects include:

1. State level survey management of hepatic injury
2. Mortality outcomes in trauma
3. Quality of life in electrical injury patients vs. thermal burn patients
4. Small Bowel Injuries
5. Repeat head CT's…are they beneficial?
6. Hypermetabolism in the burn patient
7. Pain study analysis in patients with rib fractures
8. Outcomes in the intubated elderly

Primary Children's Medical Center

Level I Regional Pediatric Trauma Center

Located in Salt Lake City, Primary Children's Medical Center reported receiving 616 pediatric trauma patients in 2001. Eric Scaife, MD is the Medical Director of the Trauma Services and Kris Hansen, RN, is the Trauma Program Manager.

Primary Children's (PCMC) is a regional, tertiary pediatric center serving five states in the intermountain west, the largest geographical service area of any children's hospital in the United States. Primary Children's is committed to providing a full range of services for the injured child, including pre-hospital care and transport, emergent stabilization, surgical care, acute care and pediatric rehabilitation.

Primary Children's was recently designated by the Department of Health as a Level I Regional Pediatric Trauma Center. The facility is an advocate for the prevention of pediatric injuries at the local, state and national levels. The Child Advocacy Department has published more than 20 features in local newspapers and television stations on safety. In addition, PCMC's web page features safety information on a variety of topics, including child abuse prevention, car seat safety, gun safety and bicycle safety. PCMC's "Hold On to Dear Life, Protecting Children" was recognized by the National Association of Children's Hospitals as a model child advocacy campaign. PCMC was selected by the National Highway Traffic Safety Administration as a recognized "Car seat training center" and as a permanent car seat fitting station. Over 2000 car seats were checked or properly installed last year by PCMC staff. "Hold Onto Dear Life" also features interventions and advocacy for child abuse prevention and gun safety.

The Department of Health and Primary Children's Medical Center have formed a partnership that supports the efforts of two RNs to direct and staff Emergency Medical Services for Children in Utah. PCMC sponsors the distribution of free bike helmets and information to patients and families. Additionally, Pediatric LifeFlight is involved in pre-hospital training and taught 30 presentations last year.

The Trauma Service provides outreach education to referring facilities, pre-hospital providers, and at regional and national conferences. In the past year, trauma physicians and nurses gave 20 presentations. Last year, the "Great Western Trauma Symposium" was offered as an outreach trauma conference to more than 180 participants from the western region.

Primary Children's participated last year in three trauma-related multi-institutional studies, "Hypothermia in the Treatment of

Severe Head Injury in Children", "Determination of Severity of Injury and Outcome in Children with Head Injury", and "A Virtual Environment for the Study of Attention in Pediatric Mild Traumatic Brain Injury". PCMC has four current grants to study pediatric trauma: "Enhancing Pediatric Safety", "Emergency Services for Children, Network Development", "Pediatric Trauma: A Population-based Study of Injury, Epidemiology and Hemodynamic Stabilization", and "Effectiveness of Playground Surface and Equipment Modification in Reducing the Incidence and Severity of Playground Fall Injuries". Last year, more than 10 trauma-related publications were published in peer-review journals, with 28 publications in peer-review journals over the past three years.

Ogden Regional Medical Center

Level II Trauma Center

Located in Ogden, the Trauma Center at the Ogden Regional Medical Center reported receiving 296 trauma patients in 2001, according to the Utah Trauma Registry. Sheila Garvey, MD, serves as the center's Trauma Chief, Joan Balcombe, MD, FACEP, serves as the Trauma Director, and Deanna Wolfe, RN, BSN, as its Trauma Coordinator.

During FY 2002, Ogden Regional Medical Center was actively engaged in community outreach and trauma prevention endeavors. An initiative addressing injury prevention for school children was launched as the Trauma Division collaborated with the Emergency Nurses Association, ENCARE (Emergency Nurses Care) program. Community outreach activities included participation in health fairs, first aid classes, Citizens Emergency Response Team (CERT) training courses, annual county wide disaster activities, and Utah's Safe Kids Coalition's "Walk to School Day". In addition, the American Trauma Society's "Red Light Running Program" was provided at local elementary schools and businesses quarterly.

The Trauma Nurse Coordinator works closely with Emergency Nurses and is currently reviewing documentation on trauma flow sheets for Quality Improvement. Ogden Regional Medical Center is actively involved with the local EMS agencies providing trauma training such the Utah Trauma Program "TEAM" course, quarterly Davis Applied Technical College EMS courses, and injury prevention course for nurses, EMS providers, police officers and educators. The trauma program works closely with EMS to provide feedback on the care they provide such as successful intubation rates and critique opportunities for advanced airway procedures.

The Medical Director and Trauma Nurse Coordinator continue to actively participate in the Utah EMS System through memberships on the Trauma System Advisory Committee, EMS Committee, QA Team, Trauma Users Group, and specialty care transport committee. Dr. Joan Balcombe, MD, FACEP, is currently the Medical Advisor for all state coordinated PHTLS courses taught though the Trauma Program.

McKay Dee Hospital

Level II Trauma Center

Located in Ogden, the McKay Dee Hospital Adult Trauma Center reported receiving 500 trauma patients in 2001, according to the Utah Trauma Registry. Steven Carbine, MD, serves as the Trauma Program Director and Kendra Fielding, RN, as its Trauma Nurse Coordinator.

IHC's brand new McKay-Dee Hospital Center in Ogden received its first patients at 6:00 a.m. on March 25, 2002. The new $190 million hospital, located four blocks south of the old McKay-Dee, is home to the recently re-designated Level II trauma center. The new 703,000 square-foot hospital has 17 OR suites, a 33-bay ER, and a 16-bed ICU. Notable features include a hospital-wide picture archive communication system, or PACS, which broadcasts digital X-rays into computers across the hospital and to physicians' offices and homes with secure access; a linear accelerator; separate hallways for guests and employees; a dedicated diagnostic testing area that houses services including X-rays, lab tests, and EKGs.

McKay Dee Hospital serves urban, rural, and recreational areas of more than 750 square miles. The institution provides primary, secondary and referral care for trauma victims.

Injury prevention and Outreach activities related to trauma care include:

1. Utah Association of EMT annual Conference
2. Safe Kids Coalition involvement
3. Trauma Education for Critical Care consortium
4. Citizen Emergency Response Team (CERT) training in Weber County
5. ENCARE program, (injury prevention arm of ENA).
6. Organ Donation education
7. Community Survival Preparedness
8. Providing Trauma Nurse Core Course (TNCC) courses and TNCC educators courses.
9. EMS in-services
10. National Disaster Medical Services education/disaster preparedness

McKay Dee's staffs provides voluntary involvement with membership on various state trauma committees and have participated on the Trauma System Task Force in the development of the new state trauma plan.

Evaluation

In addition to the trauma registry data collection system, previously explained in the introduction, the EMS Bureau also collects data from pre-hospital providers and the emergency departments. The Standards and Evaluation program provides direction and oversight for these data collection efforts. This is provided by a required minimum data set for each patient care record (run report).

The Bureau collects almost 150,000 run reports per year from these pre-hospital providers. The data collection system also includes minimum mandated data from all hospital emergency departments in the State. The last report included data from more than 600,000 patient encounters. Summary data is now available on our EMS homepage, which can be accessed at www.health.utah.gov/ems/data

The EMS Bureau is currently working on linking the Emergency Department, pre-hospital and trauma registry data so that we can better assess the continuum of care provided to trauma patients. The additional capability to link with other data sources will also provide us with the capability to review not only the critically injured but all injured

patients. This effort will demonstrate our commitment to fulfill the mandate of developing and assessing an inclusive trauma system: all injured patients, all trauma care providers and all injury related data.

Special Initiatives and Planning

Trauma System Development Guide

It is essential to have a comprehensive plan when integrating and coordinating a statewide health care delivery system. Through a HRSA grant, the Bureau of EMS established a trauma stakeholders task force to review and revise the 1995 Utah Trauma Plan. The multi-disciplinary task force consisted of 45 members from around the state. With Clay Mann, PhD., as the facilitator, the task force carefully crafted a new document that assists the Department of Health in fulfilling its statutory duties. The guide does not include the trauma center designation criteria. Those criteria are still located in the 1995 Utah Trauma Plan. However, the 2003 implementation guide includes goals, objectives, activities, obstacles, strategies and timeframes. Upon internal department review, the document will be sent to EMS agencies and hospitals for final comments.

Statewide Performance Improvement Guide

The Trauma Quality Improvement Team and Trauma System Advisory Committee have provided expertise and input on the development of a statewide performance improvement guide for the Utah Trauma System. The purpose of the guide is to provide pre-hospital providers and hospitals with a summation of the processes and activities that will become the guidance for the evaluation of the Utah Trauma System. The document identifies recommended performance measures for EMS providers, trauma centers and hospitals. The trauma committees will finalize the document in the near future after an internal department review. The final draft will go out for public comment from EMS providers and hospitals before adoption.

Bioterrorism Program

Lloyd Baker is the program manager for the Bioterrorism Program, which encompasses the Chemical Stockpile Emergency Preparedness Program (CSEPP), the Health Resources and Services Administration (HRSA) Hospital Bioterrorism Grant, the National Pharmaceutical Stockpile (NPS) Committee and the Disaster Response Units or DRUs.

As it pertains to EMS and trauma, the CSEPP program involves the preparation of area hospital personnel and medical first responders to diagnose and treat patients who might be exposed to chemical warfare agents. The funds for this program are provided by the U.S. Army and are used to prepare civilian medical entities to respond to any potential agent release from the Deseret Chemical Depot as it destroys munitions containing chemical warfare agents.

The HRSA Hospital Bioterrorism Grant was awarded to the Department of Health in mid 2002 to improve the preparedness of our hospitals and certain clinics to care for patients that might be affected by a terrorist act involving the use of biological or chemical agents.

The National Pharmaceutical Stockpile (NPS) is a cache of pharmaceutical supplies and medical equipment that can be delivered to the site of a biological or chemical event to reduce injury and death in the civilian population. State health officials can make a request for the NPS from the Centers for Disease Control and Prevention (CDC) who can airlift it to any location in the continental United States in 12 hours or less. When it arrives, it is turned over to state officials for distribution to citizens in the affected areas. Utah's NPS Committee has developed a draft plan to receive, repackage and distribute the contents of the stockpile in association with our 12 local health departments and other response partners.

The Disaster Response Units (DRU) are 8 tractor trailers full of emergency supplies and equipment that can be deployed anywhere in the state on short notice. Six of the units have beds and bedding for 100 people as well as medical supplies and equipment to treat the type of traumatic injuries that are often seen in the aftermath of natural and technological disasters. Two of the trailers are refrigerated and can be used as temporary morgues in case of a mass casualty incident

AED Project

The Standards and Evaluation program has taken the lead on a federal grant program called Rural Access to Emergency Devices. The Bureau will oversee this grant, worth almost a quarter of a million dollars. The grant is specific to the rural areas of the state, which includes 25 of 29 counties and will provide automatic external defibrillators and training in cardiopulmonary resuscitation and AED use at no cost to successful applicants. This grant program will be accomplished during 2003 and may be renewed for the following year.

UTAH TRAUMA SYSTEM PATIENT PROFILE: THE CRITICALLY INJURED

Figure 1 depicts the number of individuals injured within each county that satisfied criteria for entry into the trauma registry.

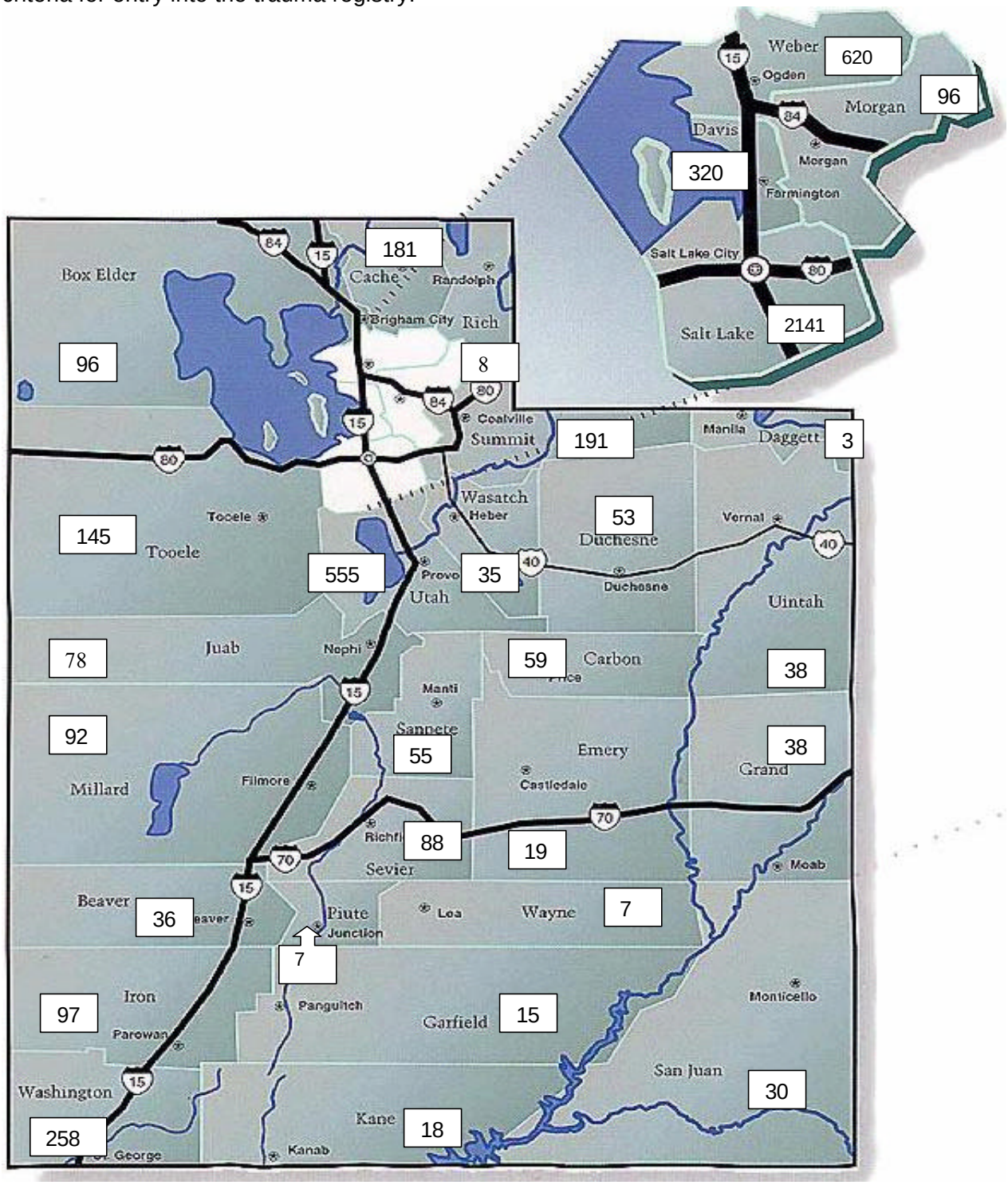


Table 1. Number of Injuries by County

Injured in Home Zip Code	Injured in Other Zip Code	County of Injury	Missing Injury Zip Codes
14	4	Beaver	18
49	27	Box Elder	20
110	50	Cache	21
21	13	Carbon	25
1	1	Daggett	1
231	78	Davis	30
24	11	Duchesne	17
11	4	Emery	4
3	7	**Garfield**	5
12	9	Grand	17
38	13	Iron	46
17	37	**Juab**	23
9	3	Kane	6
29	39	**Millard**	24
23	8	Morgan	0
3	0	Piute	4
0	4	**Rich**	4
1,156	605	Salt Lake	380
11	6	San Juan	13
25	11	Sanpete	19
26	17	Sevier	45
27	98	**Summit**	61
54	57	**Tooele**	34
17	1	Uintah	20
347	199	Utah	9
7	18	**Wasatch**	10
165	41	Washington	52
2	3	Wayne	2
414	193	Weber	13

(Injuries occurring in Utah County during the first two quarters of 2001 could not be enumerated due to technical difficulties associated with the data collection process).

Figure 1 indicates the number of individuals injured within each county who met the criteria for inclusion in the trauma registry. **Table 1** illustrates the number of county residents injured within and outside their home zip code area. These numbers, however, are somewhat biased. Injuries occurring along roadsides, or during recreational activities commonly did not list the zip code in which the injury occurred. **Bolded** counties demonstrate a high frequency of injuries occurring among residents outside their home zip code area.

Figure 2. Unintentional Injuries

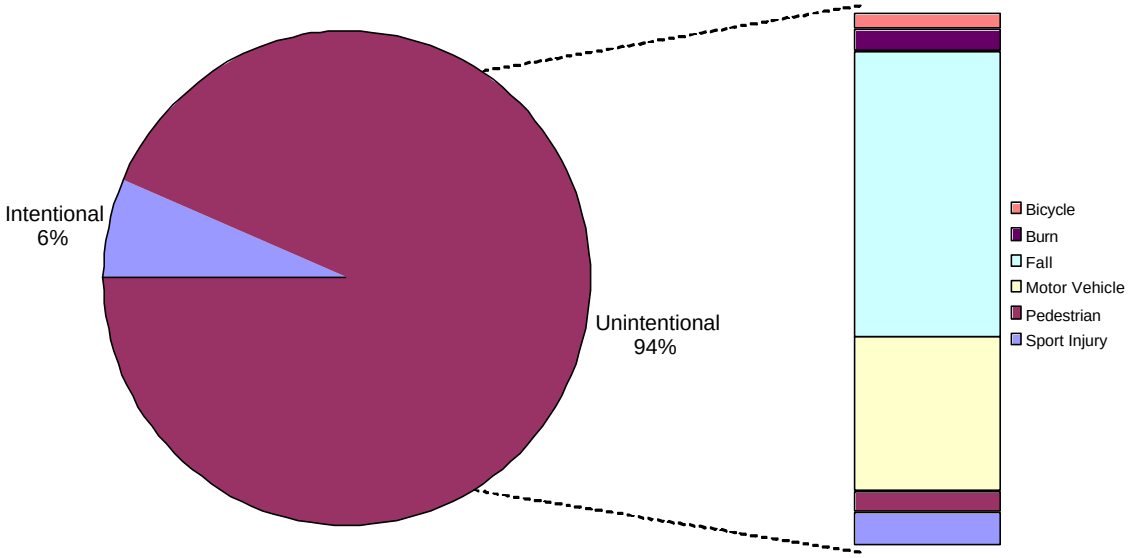


Figure 2 displays the breakdown of patients admitted to Utah hospitals for treatment of unintentional injuries. Ninety-four percent of patients admitted for trauma care suffered unintentional injuries that generally result from blunt trauma.

Figure 3. Intentional Injuries

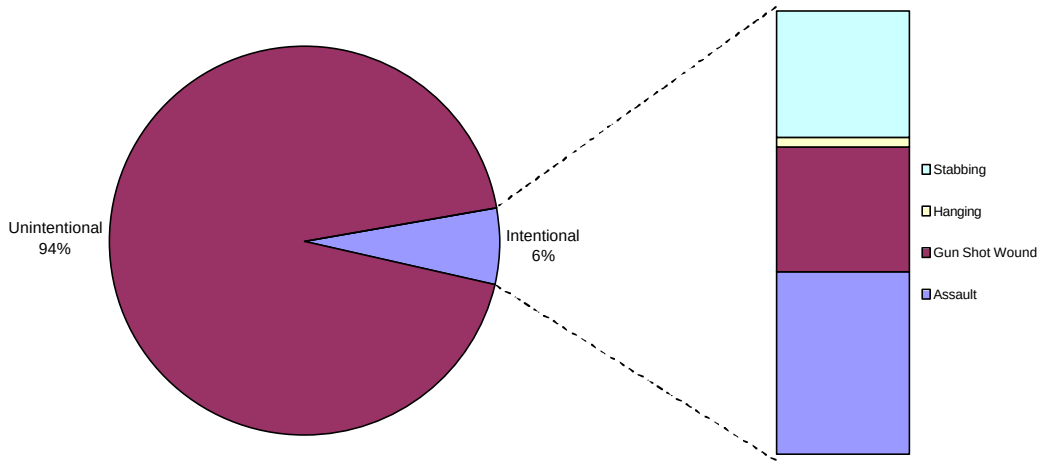


Figure 3 demonstrates the breakdown of intentional injuries, which account for 6% of patients admitted to hospitals for trauma care. Approximately, 41% of intentional injuries occurred from assault, including fights, brawls, rape, and family violence.

Trauma systems across the country track the proportion of blunt versus penetrating trauma. In Utah, 92% of the patients who received trauma care suffered from blunt trauma, and five percent sustained penetrating injuries. The frequency of penetrating injury is slightly lower in Utah than the national average (83%).

Figure 4. Causes of Blunt Injury

Figure 4. Causes of Blunt Injury

n = 5,845

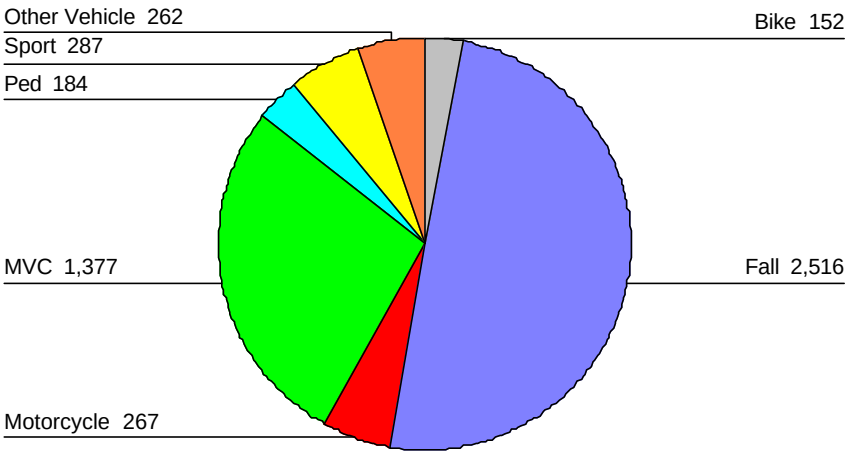


Figure 4 shows that falls and motor vehicle crashes accounted for most of the blunt trauma. Falls accounted for 43% of unintentional injuries, motor vehicle crashes accounted for 34%; 5% from sports-related injuries; 3% due to pedestrian verses a motor vehicle injuries and; a similar percentage from bicycle mishaps.

Figure 5. Causes of Penetrating Injury

n = 348

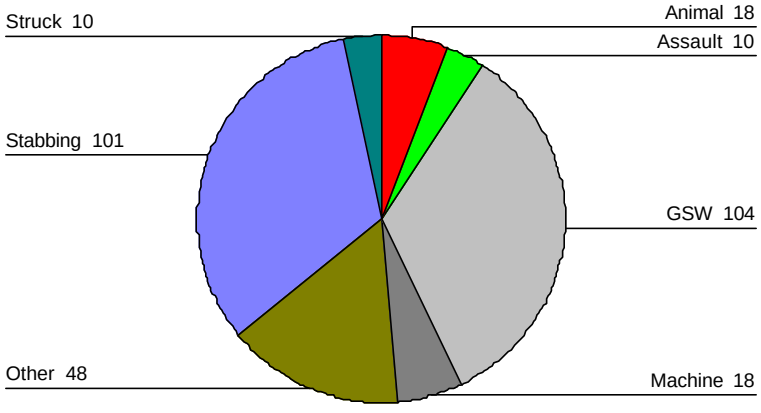


Figure 5 depicts the causes of penetrating injuries. Firearms (GSW) accounted for 30% of penetrating injuries, while stabbing caused 29% these of injuries.

Figure 6: Fatalities By Injury Cause

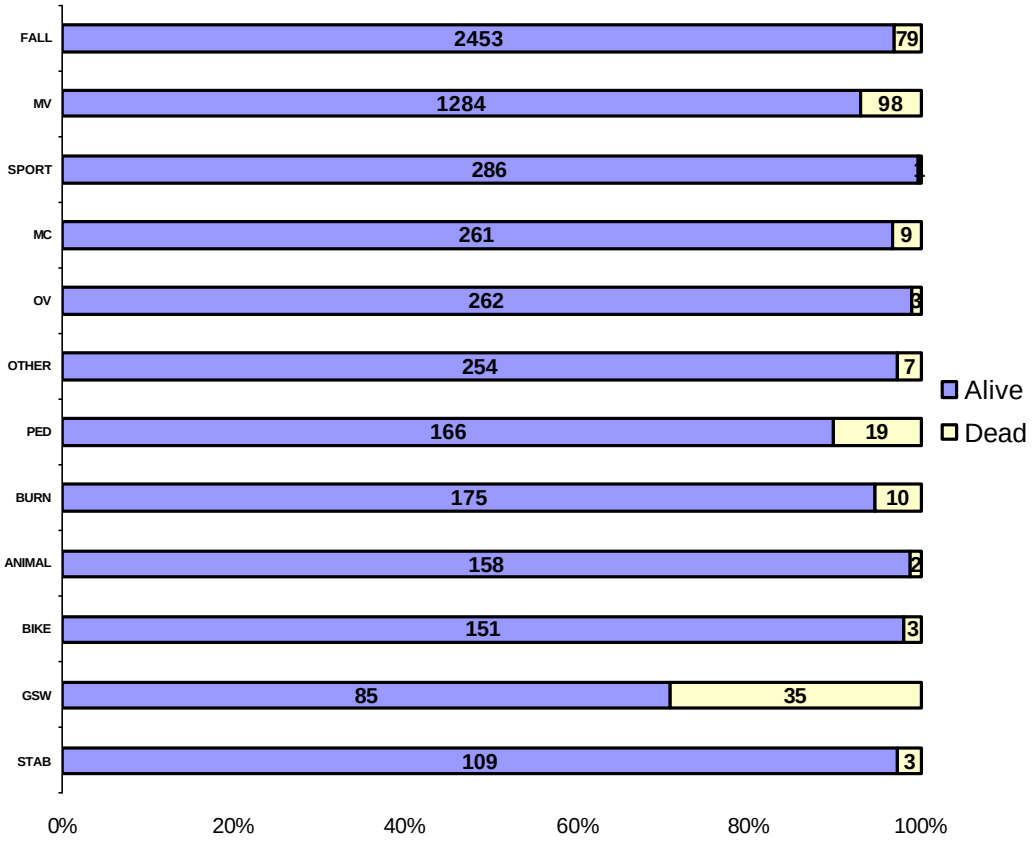
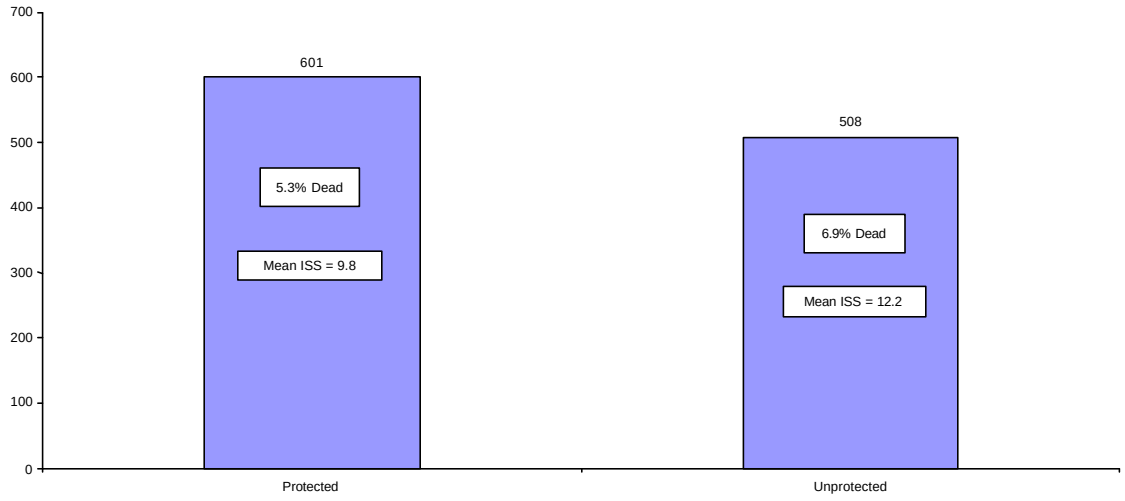


Figure 6 shows the frequency of fatality corresponding to causes of injury among patients meeting trauma registry criteria. The numeric values within the bars represent the percentage of survivors and deceased patients in each cause of injury category.

Falls were the leading cause of traumatic injury among individuals presenting to hospitals in Utah, followed by injures caused by motor vehicle crashes. The incidence of death, however, for falls (3%) and motor vehicle crashes (8%) is relatively low when compared to firearm injuries (GSW), which demonstrates an incidence of 29%. Likewise, death among individuals struck by a car (PED) was more frequent (10%) than death among general motor vehicle crashes. It is important to keep in mind that these data do not include individuals who expired at the scene of injury or shortly after hospital discharge.

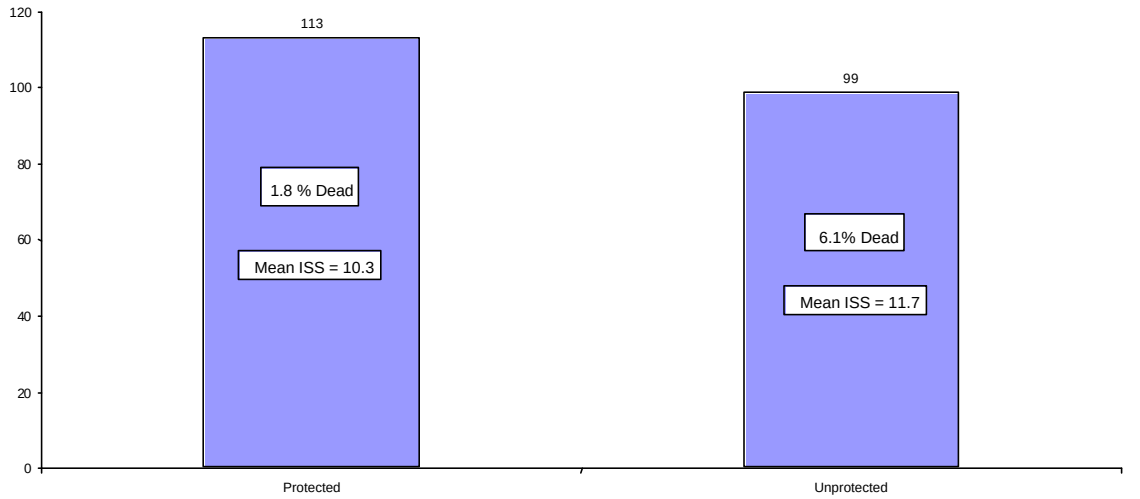
Figure 7. Restraint Use in Motor Vehicle Crashes
n = 1,109*



*Actual number of MV crashes is 1382, but 273 of these were missing information about protective device use and therefore were not included in this table.

Figure 7 reveals that 54.1% of patients reported to the Utah Trauma Registry were using a restraint device when the motor vehicle they were driving or riding in crashed. The Injury Severity Score (ISS), which is calculated from the Abbreviated Injury Scale (AIS), was lower for those who utilized a restraint device, as was the incidence of death. The AIS is a consensus-derived system that classifies injuries by body region (head/neck, face, chest, extremities, and external) giving a relative severity score ranging form 0 to 6. The ISS is calculated from the AIS by assessing injuries in each of the patient's three most severely injured body regions. An ISS of 1 indicates minimal injury, while an ISS of 15 or greater represents major injury.

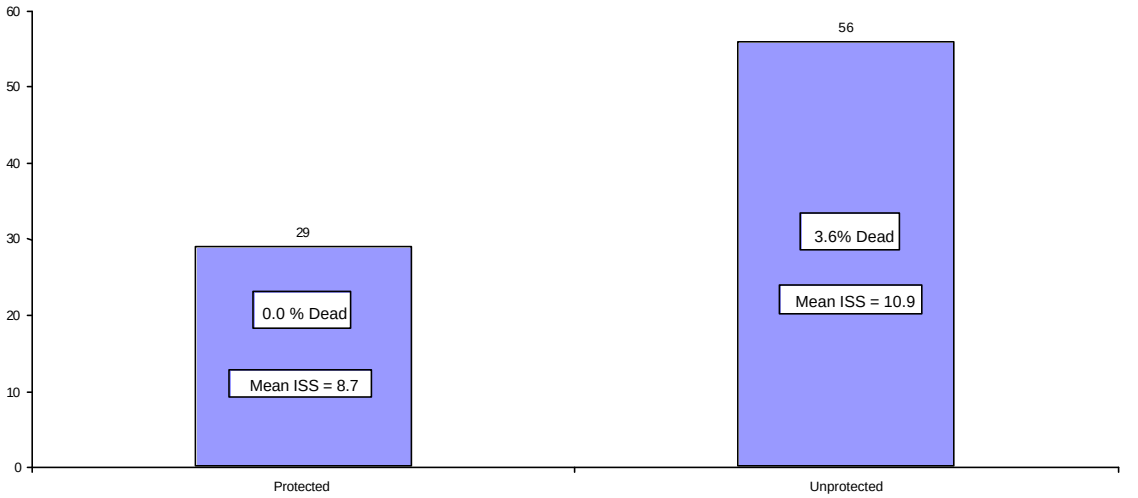
Figure 8. Helmet Use in Motorcycle Crashes
n = 212*



*Actual number of motorcycle crashes is 270, but 58 of these were missing information about protective device use and therefore were not included in this

Figure 8 shows that 54.7% of motorcyclists who crashed and received trauma care wore a helmet. While the Injury Severity Score (ISS) was not different for those who wore a helmet compared to those who did not, the incidence of death was three times higher in the non-helmeted population. Utah Trauma Registry data indicates that most motorcycle fatalities result from massive brain injury.

Figure 9. Helmet Use in Bicycle Crashes
n = 85*



*Actual number of bicycle crashes is 154, but of these 69 were missing information about protective device use and therefore were not included in this table

Figure 9 represents the use of helmets among bicyclists who crashed and required treatment at a trauma facility. It is interesting to note that fewer than 30% of bicyclists who were injured wore a helmet. For those bicyclists who were un-helmeted, the Injury Severity Score (ISS) was higher, as was the incidence of death.

Figure 10. Injury Severity by Gender

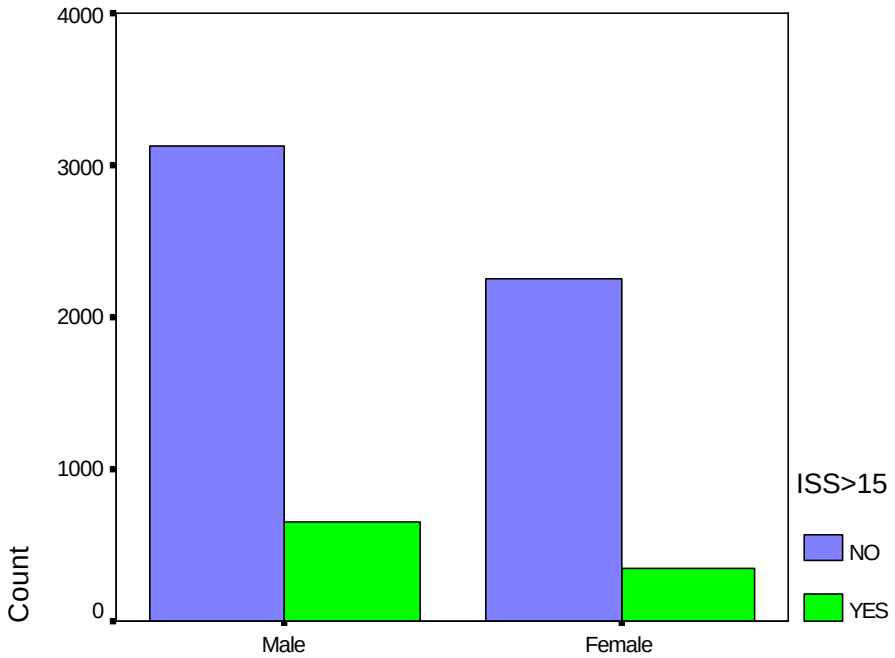


Figure 10 shows that the incidence of serious injury among males is higher than among and females. The incidence of death from injury was relatively the same between males and females.

Figure 11. Injury Severity by Age

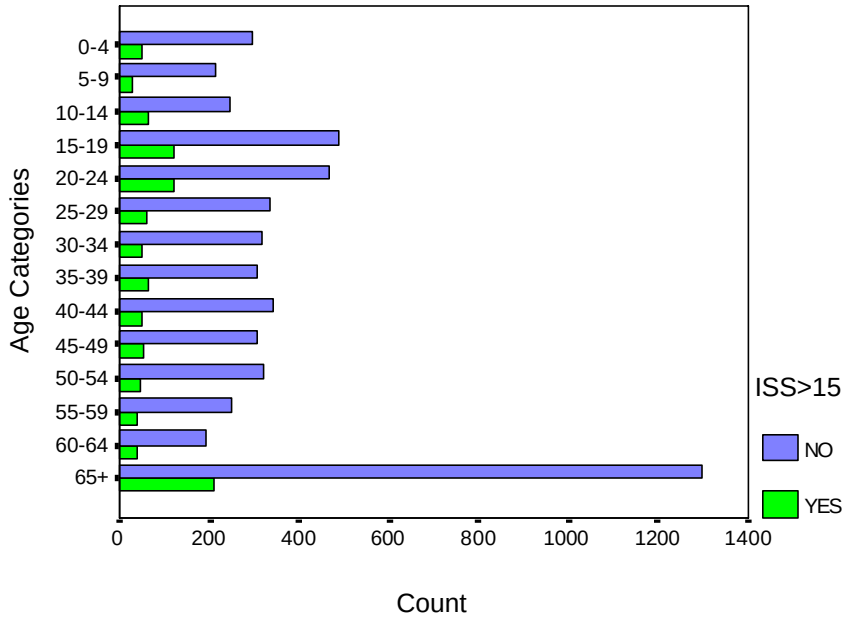


Figure 11 demonstrates the frequency of injury by age groups. Trauma, both major and minor, occurred more frequently among 15-29 year olds and among the elderly. While the rate of injury is quite high among the elderly, the likelihood of sustaining major trauma is relatively low. Major trauma (or severe injury) is denoted by an Injury Severity Score (ISS) greater than 15.

Figure 12. Fatalities by Age

n = 297

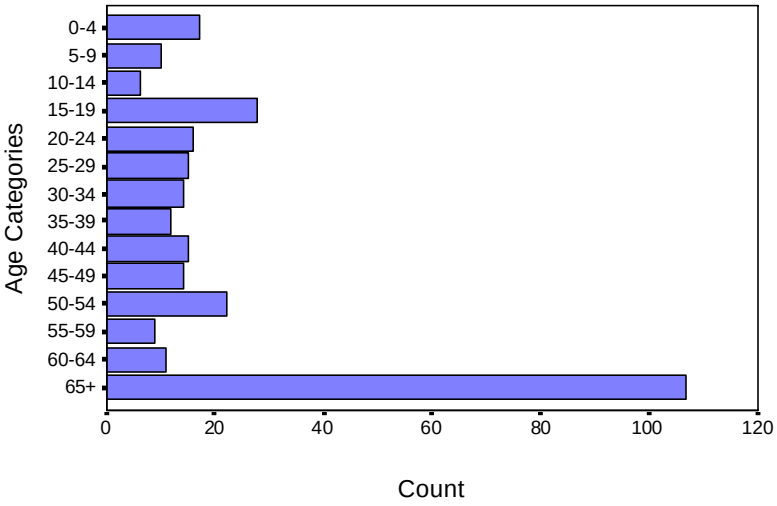
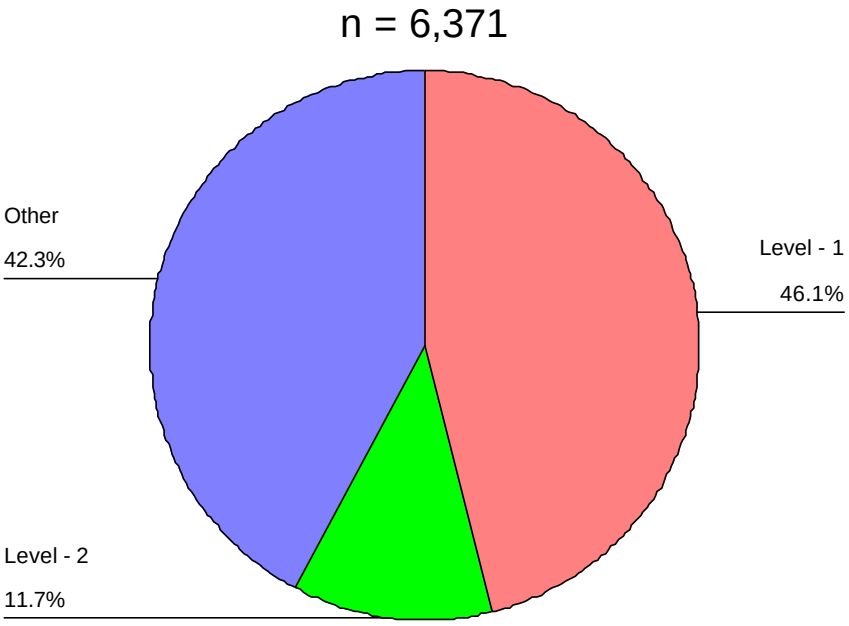


Figure 12 shows that teens and the elderly experience a higher rate of death than other age groups. In 2001, 297 Utahans died of trauma while receiving trauma care. This number does not include deaths occurring at the scene, during transport, or deaths occurring soon after discharge from the hospital. Although, the incidence of traumatic death was higher among older individuals, deaths may have been influenced by co-morbid factors such as heart disease, pneumonia, etc.

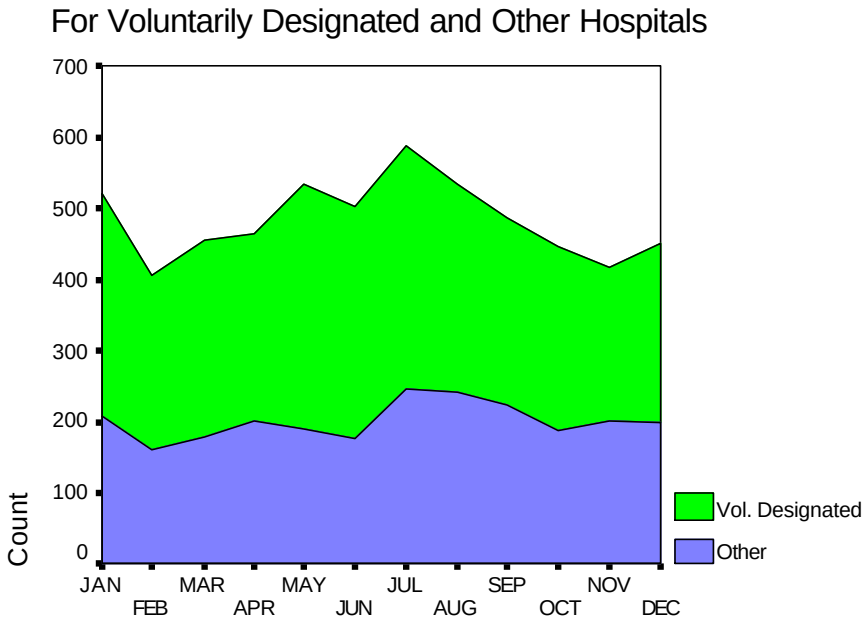
TRAUMA HOSPITAL RESOURCE UTILIZATION

Figure 13. Injury Admissions by Trauma Level



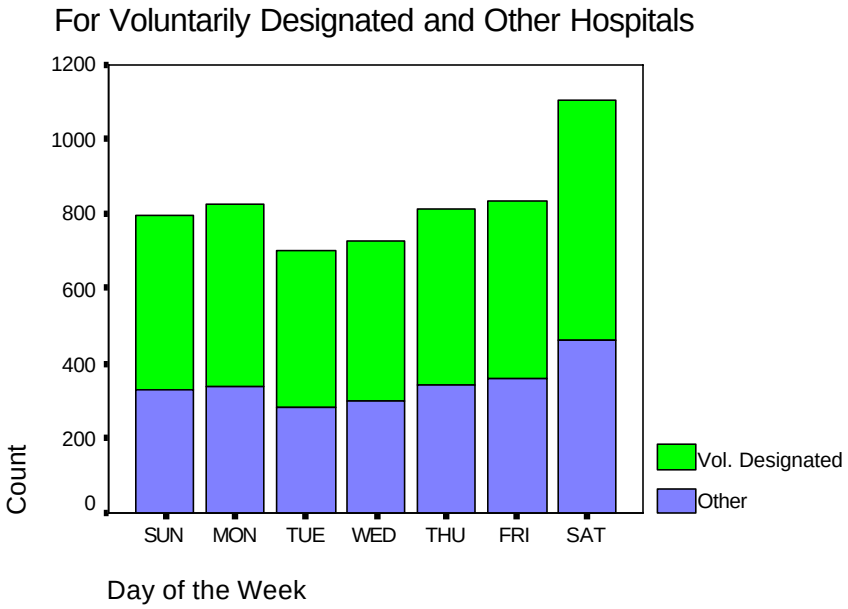
Six thousand three hundred and seventy-one patients utilized the hospital services for trauma care in 2001. **Figure 13** shows that 2,935 (46%) patients meeting trauma registry criteria received care from a Level I hospital and 744 (12%) from a Level II trauma center. A significant number of patients (2,692 [42%]) received care at other hospitals.

Figure 14. Monthly Admissions



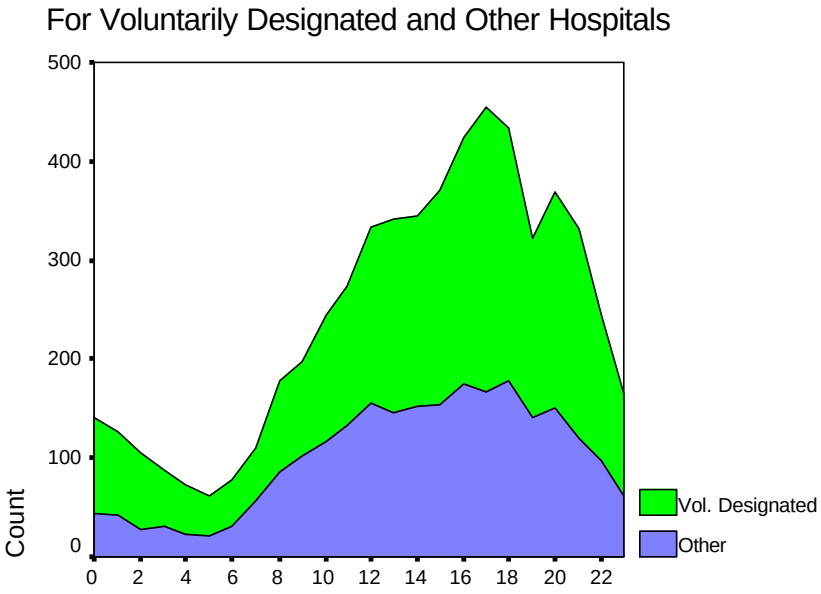
Consistent with the national data, traumatic injury in Utah tends to peak during the summer months. This trend is consistent for both voluntarily designated and other hospitals. Inclement weather may account for the upsurge of trauma injuries noted during the winter months (**Figure 14**).

Figure 15. Admissions by Day of the Week



Typically, more traumatic injuries occur Saturday afternoon through early Sunday than on any other day of the week as illustrated in **Figure 15**

Figure 16. Admissions by Hour: Military Time



To provide adequate staffing and assure that appropriate resources are available, hospitals track the time of day when injured patients are admitted for care. **Figure 16** illustrates that most patients (60%) arrived for emergency care between 1 p.m. and midnight, and 16% between midnight and 8 a.m.

Figure 17 illustrates the distribution of "serious injuries" presenting to voluntarily designated trauma centers. "Serious injury" was assumed if the primary ICD-9-CM injury code listed for the patient could be categorized in one of the following groups:

Head Injury: 800, 801, 803, 804, 851, 852, 853, 854.
Chest Injury: 807.03-807.09, 807.13-807.19, 807.4, 860, 861.20-861.22, 861.30-861.32, 862.00-862.10, 862.80-862.90.
Femur/Open tibia fractures: 821, 823.30-823.32, 823.90-823.92.
Spleen/Liver: 864, 865.

These injuries were chosen because they represent injuries with significant potential for morbidity and/or mortality.

Figure 17. Serious Injuries Presenting To Voluntarily Designated Centers

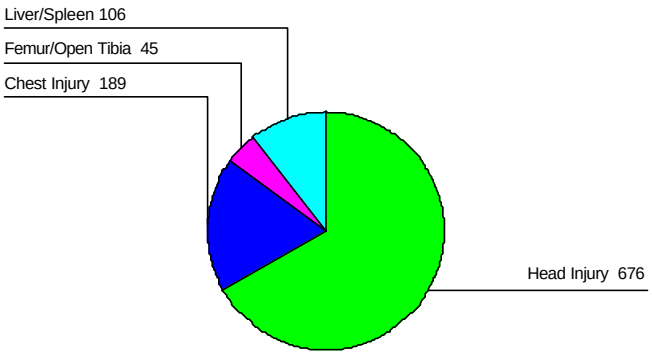


Figure 18 shows the distribution of "serious injuries" presenting to other hospitals.

Figure 18. Serious Injuries Presenting To Other Hospitals

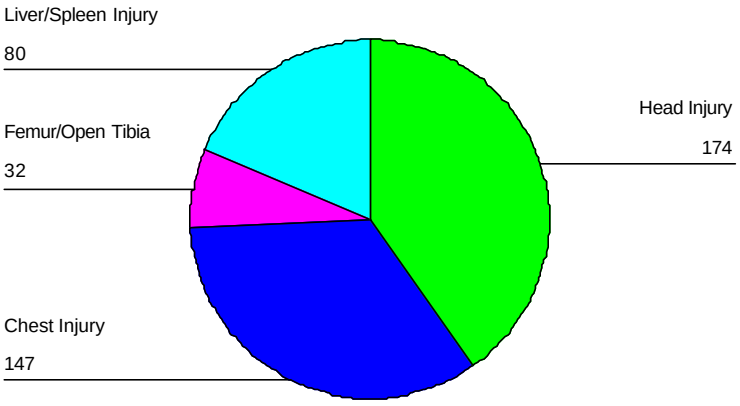


Figure 19a. Voluntarily Designated Center

Patient Disposition from the ED

n = 3,679

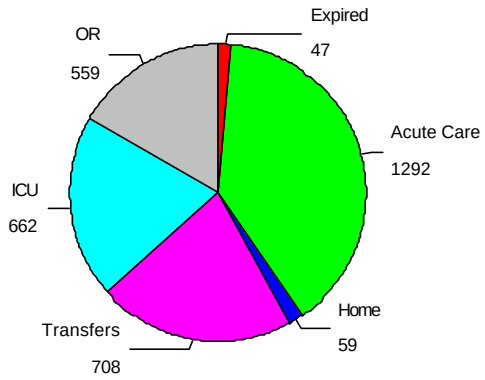


Figure 19b. Other Hospital

Patient Disposition from the ED

n = 2,692

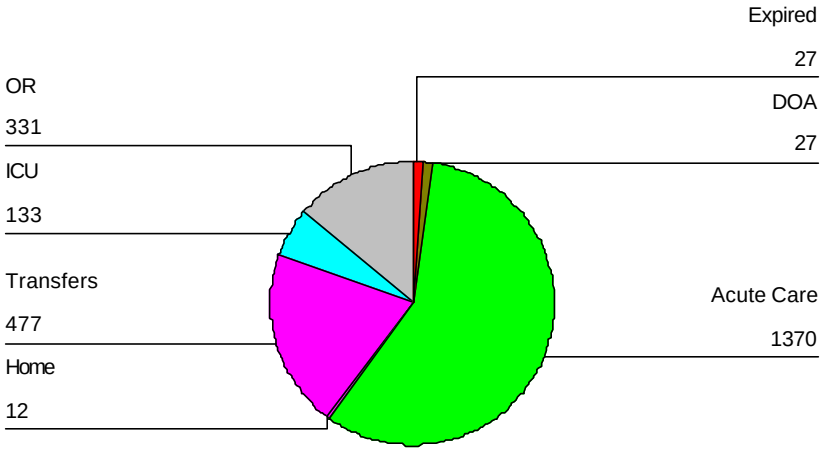


Figure 19a and b display the disposition of patients admitted to emergency departments for voluntarily designated trauma centers and other hospitals. Ninety-seven percent of the patients meeting the trauma registry inclusion criteria required hospitalization, while one percent was discharged home following evaluation by hospital personnel. A significant percentage of patients (12%) were admitted to an intensive care unit (ICU) following care in the emergency department, and 14% were taken to the operating room for emergency surgery. Nineteen percent of the patients required transfer to a higher-level trauma center for definitive management or subspecialty care. Less than 1% of the patients entered into the trauma system died in the emergency department.

Figure 20a. Voluntarily Designated Center

Patient Disposition Following Hospitalization

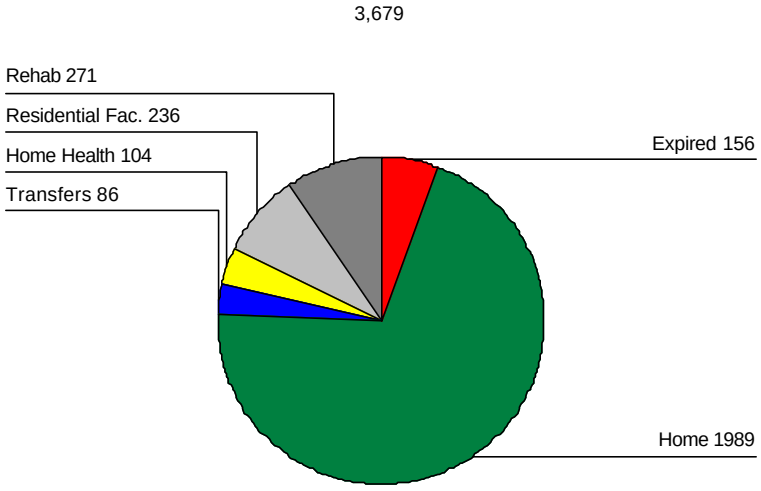


Figure 20b. Other Hospital

Patient Disposition Following Hospitalization

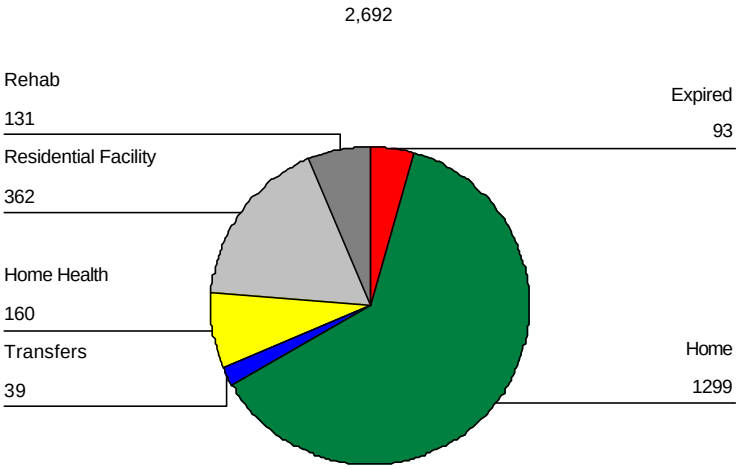


Figure 20a and b display the disposition of trauma system patients who were hospitalized for definitive care at voluntarily designated trauma centers or other hospitals. Although 52% of trauma patients were able to return home after hospitalization, it is assumed that further recovery was often needed before the patient was able to resume pre-injury activities. In fact, 4% required home health services. Approximately 18% of patients who were discharged from hospital care required further rehabilitation or additional care in a skilled nursing facility (SNF), rehabilitation center, or other acute care hospital.

Figure 21. Hospital Length of Stay

n = 4,593

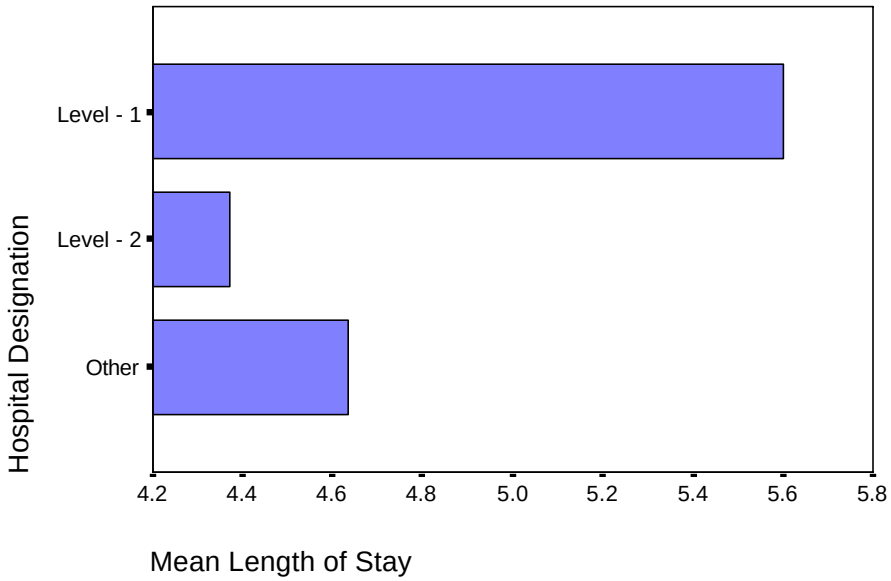


Figure 21 shows the mean hospital length of stay for injured patients. Length of hospital stay was longer for patients receiving care at a Level I trauma center. This increased length of stay is probably related to the seriousness of injuries cared for at Level I trauma centers.

Figure 22. Hospital Admission by Injury Severity

n = 6,371

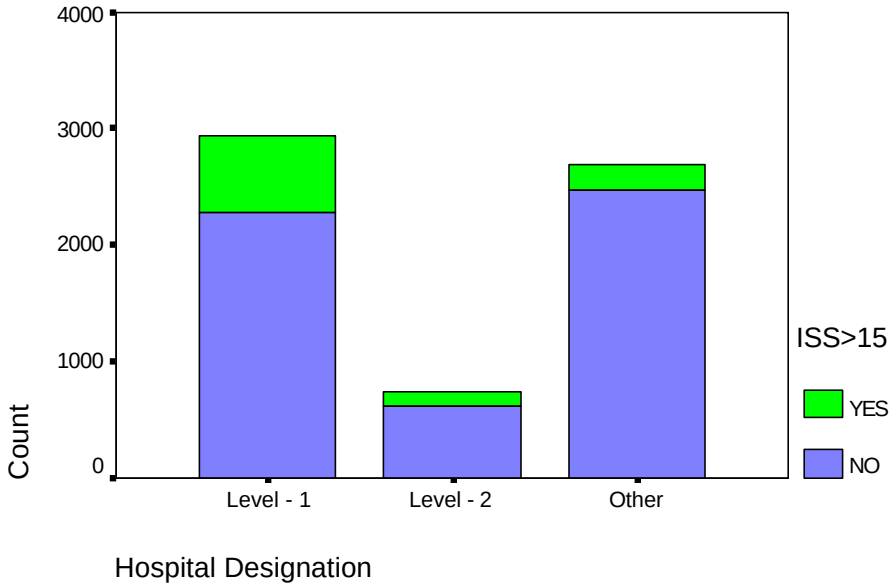


Figure 22 illustrates hospital admission by trauma center designation. Most severely injured patients were admitted to voluntarily designated trauma centers. However, a number of patients with severe injuries (n=222) were admitted to other hospitals.

Figure 23a. Mode of Patient Transport

To Voluntarily Designated Trauma Centers

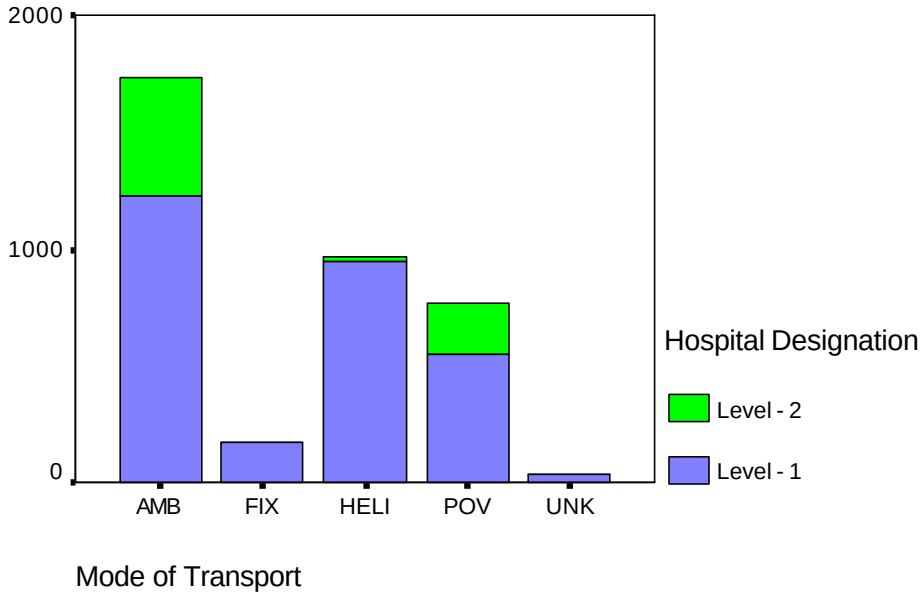
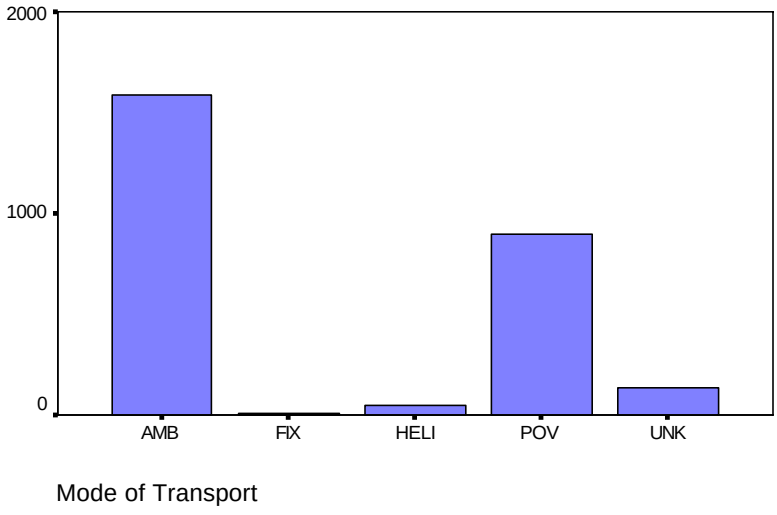


Figure 23b. Transport

To Other Hospitals



Figures 23a and b demonstrate the difference in mode of transport for patients presenting to voluntarily designated trauma centers verses other hospitals. More patients arrived at voluntarily designated trauma centers (particularly Level-1 transports) via aeromedical transport compared to transports to other hospitals. The following is a description of the above abbreviations used in the graphs: AMB=ambulance, FIX=fixed wing aircraft, HELI=helicopter, POV="Per other vehicle" (private vehicle, walk-in, bus, non-EMS).

Figure 24a. Origin of Transport To Voluntarily Designated Treatment Centers

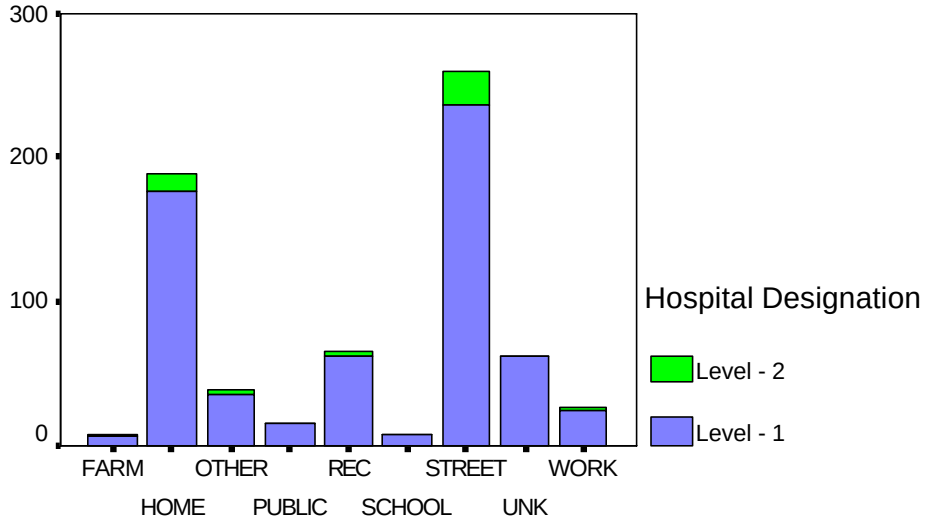
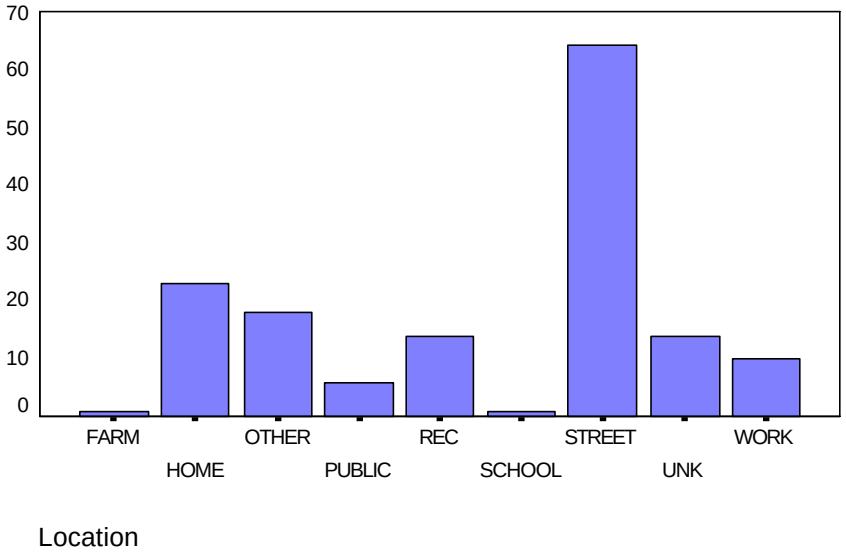


Figure 24b. Origin of Transport To Other Hospitals



Figures 24a and b indicate little difference in the origin of the transport among patients presenting to voluntarily designated trauma centers (Figure 26a) compared to patients admitted to other hospitals (Figure 26b).

Figure 25. Frequency of Inter-Facility Transfer by ISS

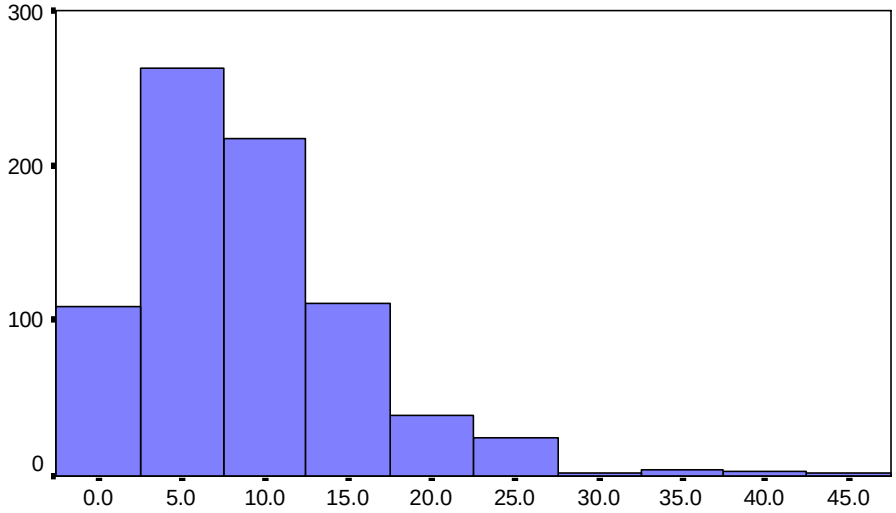


Figure 25 suggests that some patients with less severe injuries are transferred to other facilities from local emergency departments. These data suggest that factors other than injury severity may be affecting the decision to transfer a patient to a definitive care trauma center.

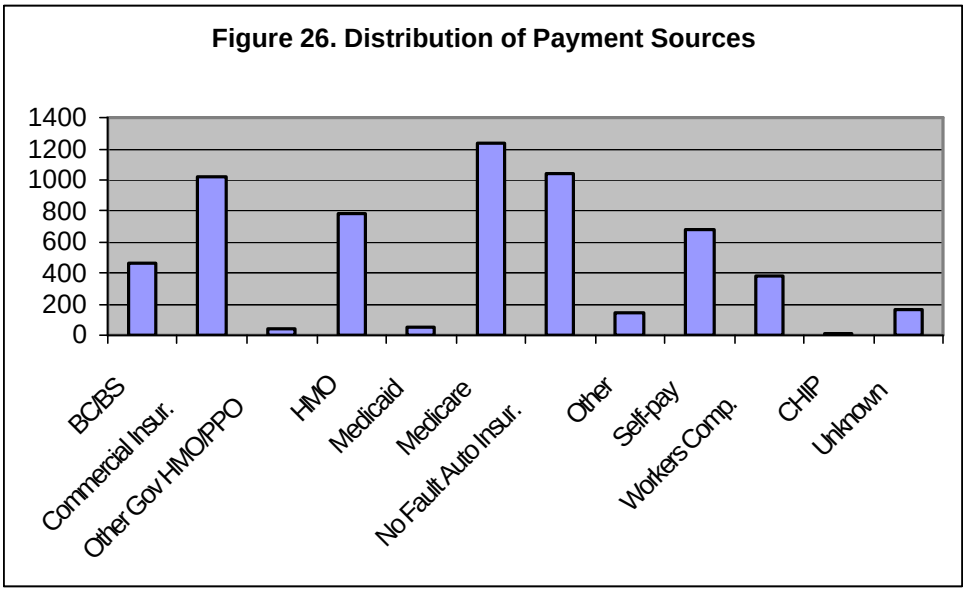
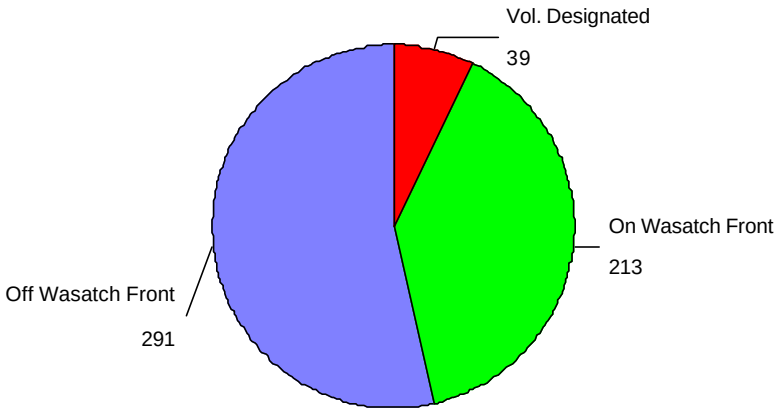


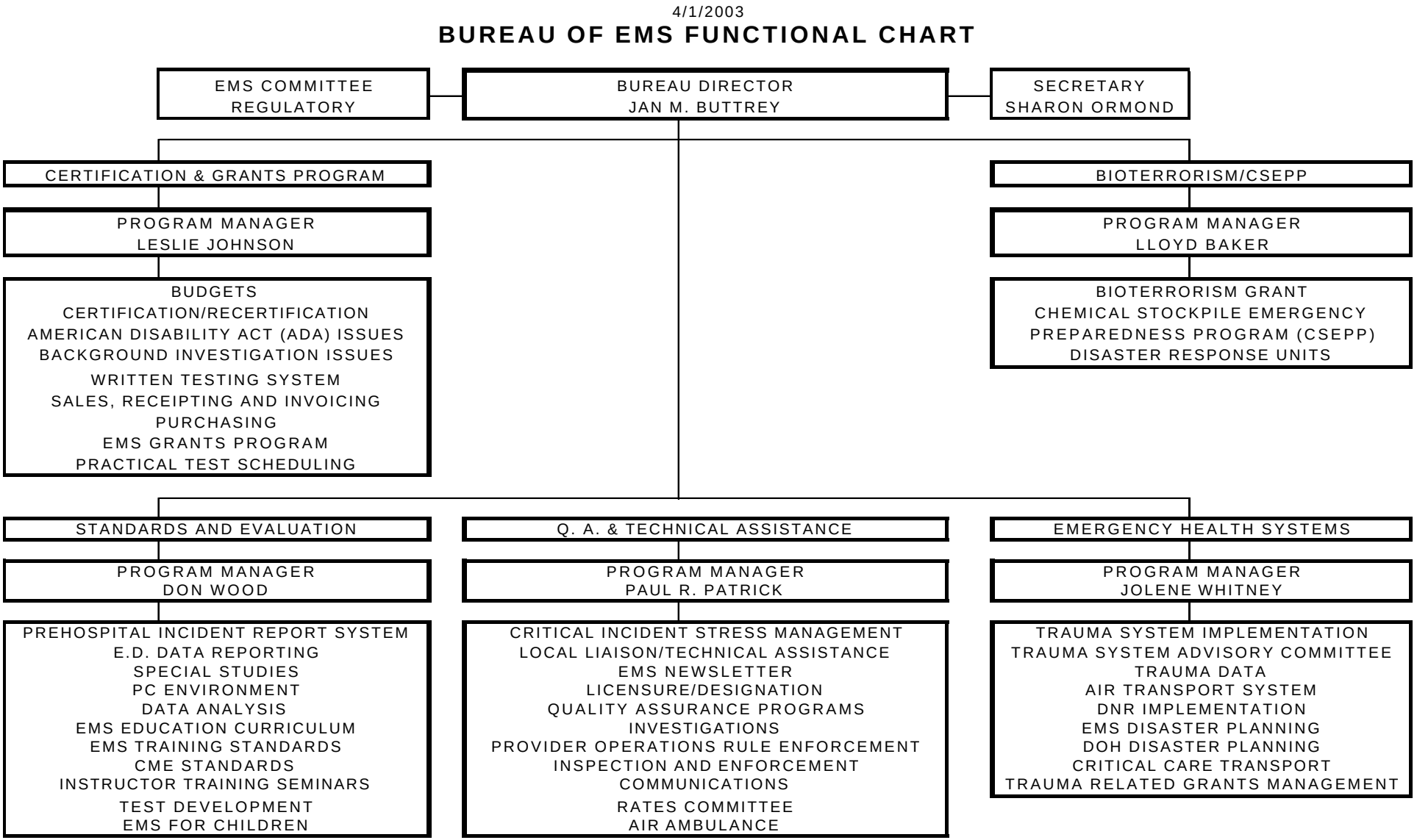
Figure 26 illustrates the distribution of payment sources utilized to reimburse physician and hospital charges associated trauma services provided.

Figure 27 provides an indication of the number of patient records missing from the trauma registry. This table was constructed by identifying patients transferred to a higher level of trauma care for which no referring hospital registry entry was available. A total of 543 registry patients were transferred to a higher level and no abstraction was performed at the presenting hospital.

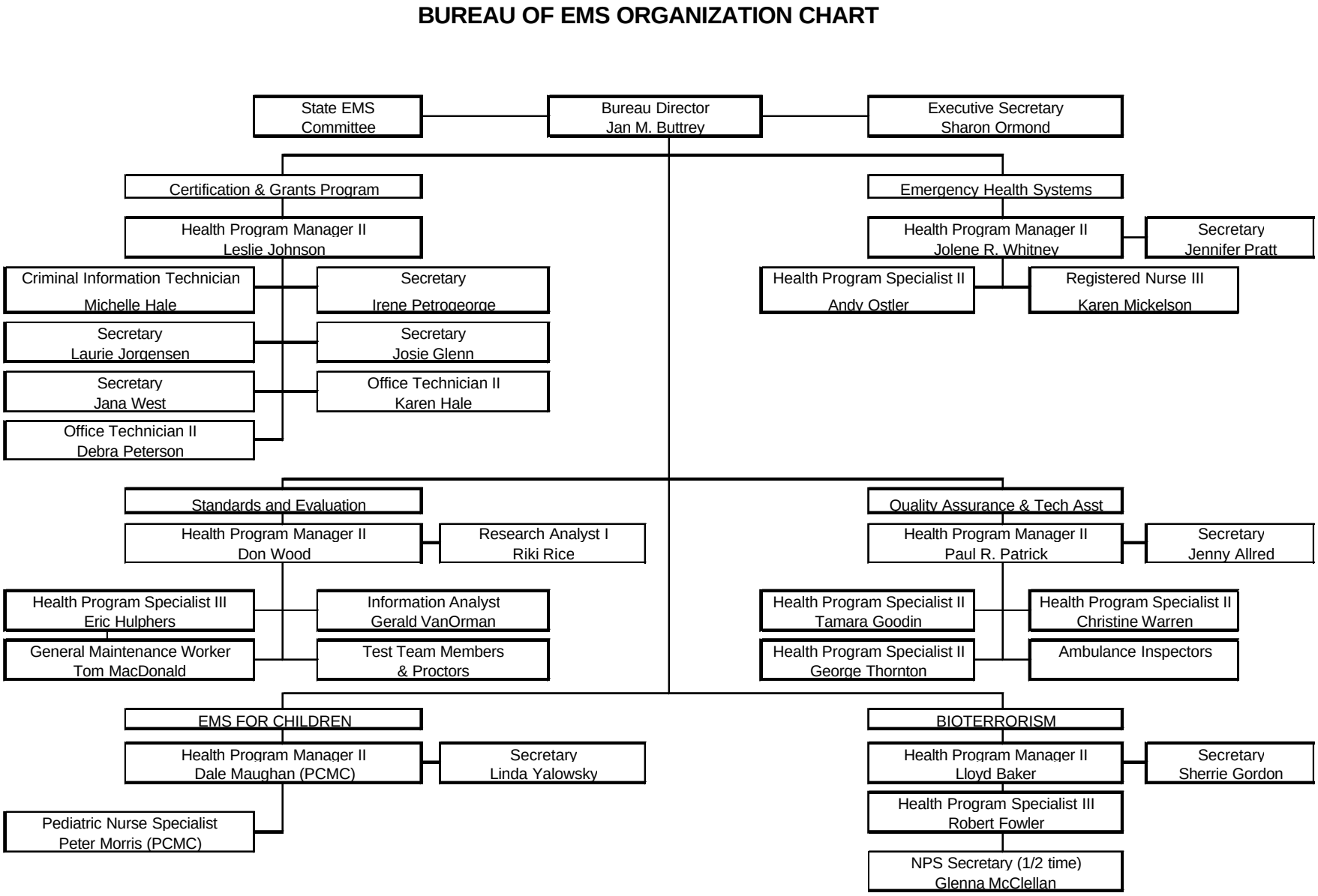
Figure 27. Patients with Missing Initial Visit Record



Function Chart



Organization Chart



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Surgeon
University of Utah Hospitals and Clinics

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Mountain View Hospital

Dennis Wyman, MD
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Davis County Sheriff's Department

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Valley View Hospital

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Castle View Hospital

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Primary Children's Medical Center

Greg Rosenvall,
Utah Hospital Association

Vicki Kershaw, MBA
Trauma Center Administrator
LDS Hospital

Deanna Wolfe RN, BSN
ENA/ Trauma Program Manager
Ogden Regional Medical Center

David Basinger, EMT-P
Ambulance Provider Rural
Gold Cross Ambulance

Eric Froerer, EMT-P
Air Ambulance Flight Paramedic
University of Utah Hospitals and Clinics

Clay Mann, PhD
Epidemiologist
Intermountain Injury Control Research Center

George Sumner, Chief
Fire Chief's Association
Bountiful Fire Department

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Surgeon
University of Utah Hospitals and Clinics

Eric Swanson, MD
Emergency Department, Air Ambulance
Medical Director
University of Utah Hospitals and Clinics

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Trauma Program Administration
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Surgeon
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Primary Children's Medical Center

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McKay Dee Hospital

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Utah Department of Health

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Trauma Program Manger
University of Utah Hospitals and Clinics

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University of Utah Hospitals and Clinics

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Primary Children's Medical Center

Frank Thomas, MD
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Life Flight, LDS Hospital

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Primary Children's Medical Center

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Utah Valley Medical Center

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